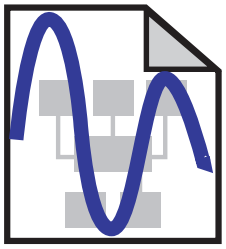
RecordBase View



User Manual

Version v4.0 Rev 0

Preface

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Using This Guide

This User Manual describes the installation and operation of the RecordBase View application. It is intended to support the first time user and clarify the details of the software.

The manual uses a number of conventions to denote special information:

Example	**Describes**
Start>Settings>Control Panel	Choose the Control Panel submenu in the Settings submenu on the Start menu.
Right-click	Click the right mouse button.
Recordings	Menu items and tabs are shown in italics.
Service	User input or keystrokes are shown in bold.
Text boxes similar to this one	Relate important notes and information.
..	Indicates more screens.
▶	Indicates further drop-down menu, click to display list.
	Indicates a warning.

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Version Compatibility

RecordBase View Compatibility																			
Record-Base View Installation	Works with records produced by (specified version and below):																		
	LPRO 2100	LPRO 4000	TPRO 8700	TPRO 4000	FPRO 5100	FPRO 215	FPRO 235	FPRO 4000	BPRO 8700	BPRO 8701	BPRO 4000	BPRO MBB	SPRO 4000	SPRO 4001	TESLA 2000	TESLA 3000	TESLA 4000	TESLA 4003	TESLA LITE
v4.0 Rev 0	v5.0	v2.5	v4.2	v1.2	v3.0	v1.0	v1.0	v1.0	v3.1	v2.0	v2.0c	v1.0	v1.0a	v2.0	v4.1	v2.7	v1.8a	v1.0	v1.0
v3.4 Rev 1	v4.0	v2.5	v4.2	v1.2	v3.0	v1.0	v1.0	v1.0	v3.1	v2.0	v2.0a	v1.0	v1.0a	v2.0	v4.1	v2.7	v1.8	v1.0	v1.0
v3.4 Rev 0	v4.0	v2.5	v4.2	v1.2	v3.0	v1.0	v1.0	v1.0	v3.1	v2.0	v2.0a	v1.0	v1.0a	v2.0	v4.1	v2.7	v1.7	v1.0	v1.0
v3.3 Rev 0	v4.0	v2.5	v4.2	v1.2	v3.0	v1.0	v1.0	v1.0	v3.1	v2.0	v2.0a	v1.0	v1.0a	v1.0	v4.1	v2.7	v1.7	v1.0	v1.0
v3.2 Rev 0	v4.0	v2.4a	v4.2	v1.1	v3.0	n/a	n/a	v1.0	v3.1	v2.0	v2.0a	v1.0	v1.0a	n/a	v4.1	v2.7	v1.7	v1.0	v1.0
v3.1 Rev 0	v4.0	v2.2	v4.1	v1.0	v3.0	n/a	n/a	n/a	v3.1	v2.0	v2.0	n/a	v1.0	n/a	v4.1	v2.6	v1.5	v1.0	v1.0
v3.0 Rev 0	v4.0	v2.2	v4.1	v1.0	v3.0	n/a	n/a	n/a	v3.1	v2.0	v2.0	n/a	v1.0	n/a	v4.1	v2.5	v1.3	v1.0	v1.0
v2.5 Rev 0	v4.0	v2.1	v4.1	n/a	v3.0	n/a	n/a	n/a	v3.1	v2.0	v1.0b	n/a	v1.0	n/a	v4.1	v2.4	v1.2	n/a	v1.0
v2.4 Rev 0	v4.0	v2.0	v4.1	n/a	v2.0a	n/a	n/a	n/a	v3.1	v1.0b	v1.0b	n/a	v1.0	n/a	v4.1	v2.4	v1.2	n/a	n/a
v2.3 Rev 0	v4.0	v2.0	v3.5	n/a	v2.0a	n/a	n/a	n/a	v3.0	v1.0b	v1.0a	n/a	v1.0	n/a	v4.1	v2.3d	v1.1	n/a	n/a
v2.2 Rev 0	v3.5	v2.0	v3.5	n/a	v2.0a	n/a	n/a	n/a	v2.3	v1.0b	v1.0	n/a	n/a	n/a	v4.0a	v2.0a	v1.0	n/a	n/a
v2.1 Rev 1	v3.5	v1.0	v3.5	n/a	v2.0a	n/a	n/a	n/a	v2.2	v1.0b	v1.0	n/a	n/a	n/a	v4.0a	v2.0a	n/a	n/a	n/a
v2.1 Rev 0	v3.5	v1.0	v3.5	n/a	v2.0a	n/a	n/a	n/a	v2.2	v1.0b	v1.0	n/a	n/a	n/a	v4.0a	v2.0a	n/a	n/a	n/a
v2.0 Rev 1	v3.5	v1.0	v3.5	n/a	v2.0a	n/a	n/a	n/a	v2.2	v1.0b	v1.0	n/a	n/a	n/a	v4.0a	v2.0a	n/a	n/a	n/a
v2.0 Rev 0	v3.5	v1.0	v3.5	n/a	v2.0a	n/a	n/a	n/a	v2.2	v1.0b	v1.0	n/a	n/a	n/a	v4.0a	v2.0a	n/a	n/a	n/a

Please contact ERLPhase Customer Service for complete Revision History.

System Requirements and Software Installation

Hardware

The minimum hardware requirements are:

- 1 GHz processor
- 2 GB RAM
- 20 GB available hard disk space

Operating System

The following software must be installed and functional prior to installing RecordBase View software:

- Microsoft Windows XP Professional Service Pack 3 or
- Microsoft Windows 7 Professional Service Pack 1 32-bit or 64-bit

Software Installation

The CD-ROM contains software and the User Manual for the RecordBase View.

Software is installed directly from the CD-ROM to a Windows PC.

The CD-ROM contains the following:

- RecordBase View interface software
- RecordBase View User Manual in PDF format

To Install Software on the Computer

Insert the CD-ROM in the drive. The CD-ROM should open automatically. If the CD-ROM does not open automatically, go to Windows Explorer and find the CD-ROM (usually on D drive). Open the ERLPhase.exe file to launch the CD-ROM.

To install the software on the computer, click the desired item on the screen. The installation program launches automatically. Installation may take a few minutes to start.

To view the RecordBase View User Manual the user must have Adobe Acrobat on the computer. If a copy is needed, download a copy at www.adobe.com.

Anti-virus/Anti-spyware Software

If an anti-virus/anti-spyware software on your local system identifies any of the ERLPhase applications as a “potential threat”, it will be necessary to configure your anti-virus/anti-software to classify it as “safe” for its proper operation. Please consult the appropriate anti-virus/anti-spyware software documentation to determine the relevant procedure.

1 Starting RecordBase View

1.1 Overview

RecordBase View is a Windows-based software tool for displaying and managing records from ERLPhase relays. RecordBase View features include:

- Record displays and analysis
- Storage and management of records in database
- Record summaries including event lists and user annotation
- COMTRADE, PTI and MS Excel export
- Windows Explorer integration
- Compatibility with RecordBase Server database

RecordBase View makes use of a Microsoft Access database file. You do not need to have your own copy of Access.

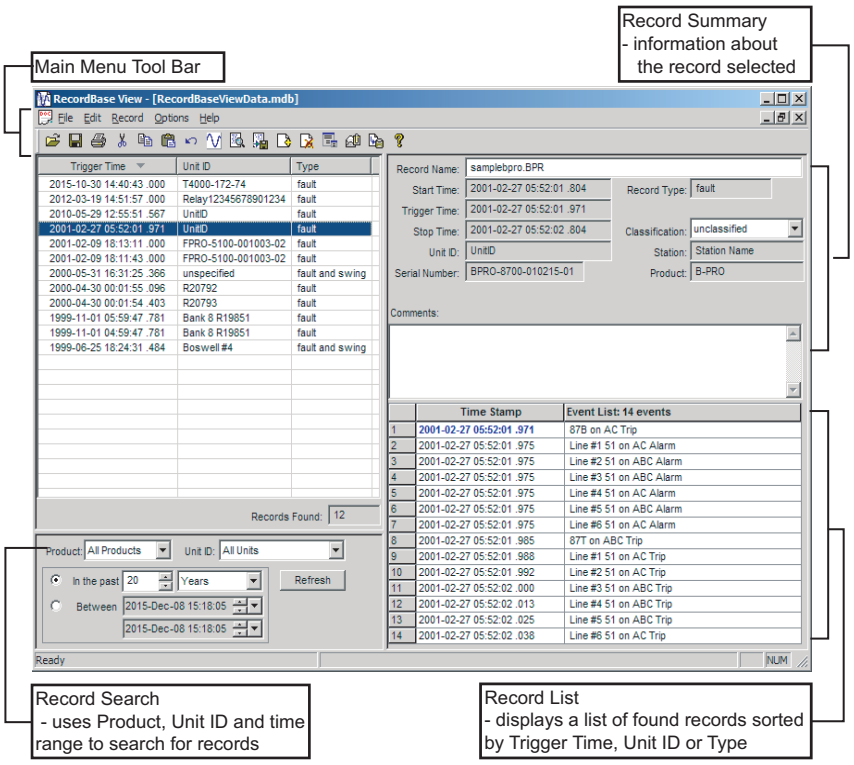

Record Summary
- information about
the record selected
Main Menu Tool Bar
RecordBase View - [RecordBaseViewData.mdb]
File Edit Record Options Help
Trigger Time Unit ID Type
2015-10-30 14:40:43 .000 T4000-172-74 fault
2012-03-19 14:51:57 .000 Relay12345678901234 fault
2010-05-29 12:55:51 .567 UnitID fault
2001-02-27 05:52:01 .971 UnitID fault
2001-02-09 18:13:11 .000 FPRO-5100-001003-02 fault
2001-02-09 18:11:43 .000 FPRO-5100-001003-02 fault
2000-05-31 16:31:25 .366 unspecified fault and swing
2000-04-30 00:01:55 .096 R20792 fault
2000-04-30 00:01:54 .403 R20793 fault
1999-11-01 05:59:47 .781 Bank 8 R19851 fault
1999-11-01 04:59:47 .781 Bank 8 R19851 fault
1999-06-25 18:24:31 .484 Boswell #4 fault and swing
Records Found: 12
Record Name: samplebpro.BPR
Start Time: 2001-02-27 05:52:01 .804
Trigger Time: 2001-02-27 05:52:01 .971
Stop Time: 2001-02-27 05:52:02 .804
Unit ID: UnitID
Serial Number: BPRO-8700-010215-01
Record Type: fault
Classification: unclassified
Station: Station Name
Product: B-PRO
Comments:
Time Stamp Event List: 14 events
1 2001-02-27 05:52:01 .971 87B on AC Trip
2 2001-02-27 05:52:01 .975 Line #1 51 on AC Alarm
3 2001-02-27 05:52:01 .975 Line #2 51 on ABC Alarm
4 2001-02-27 05:52:01 .975 Line #3 51 on ABC Alarm
5 2001-02-27 05:52:01 .975 Line #4 51 on AC Alarm
6 2001-02-27 05:52:01 .975 Line #5 51 on ABC Alarm
7 2001-02-27 05:52:01 .975 Line #6 51 on AC Alarm
8 2001-02-27 05:52:01 .985 87T on ABC Trip
9 2001-02-27 05:52:01 .988 Line #1 51 on AC Trip
10 2001-02-27 05:52:01 .992 Line #2 51 on AC Trip
11 2001-02-27 05:52:02 .000 Line #3 51 on ABC Trip
12 2001-02-27 05:52:02 .013 Line #4 51 on ABC Trip
13 2001-02-27 05:52:02 .025 Line #5 51 on ABC Trip
14 2001-02-27 05:52:02 .038 Line #6 51 on AC Trip
Product: All Products
Unit ID: All Units
In the past 20 Years
Between 2015-Dec-08 15:18:05
2015-Dec-08 15:18:05
Refresh
Ready
NUM
Record Search
- uses Product, Unit ID and time
range to search for records
Record List
- displays a list of found records sorted
by Trigger Time, Unit ID or Type

Figure 1.1: RecordBase View Opening Window

Anti-virus/Anti-spyware Software

If an anti-virus/anti-spyware software on your local system identifies any of the ERLPhase applications as a “potential threat”, it will be necessary to configure your anti-virus/anti-software to classify it as “safe” for its proper operation. Please consult the appropriate anti-virus/anti-spyware software documentation to determine the relevant procedure.

1.2 Launching RecordBase View

There are two methods to launch RecordBase View:

Method 1: Desktop

Double-click the icon labelled *RecordBase View* on your desktop.

Method 2: Windows Start Menu

Start>Programs>ERLPhase>RecordBase View

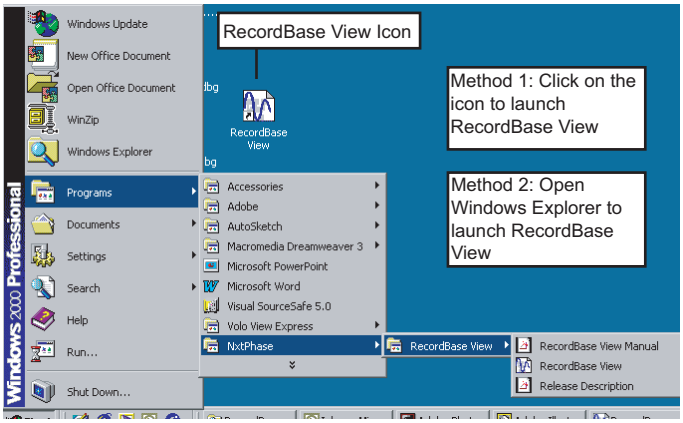


Figure 1.2: Launch RecordBase View

Main Menu Tool Bar

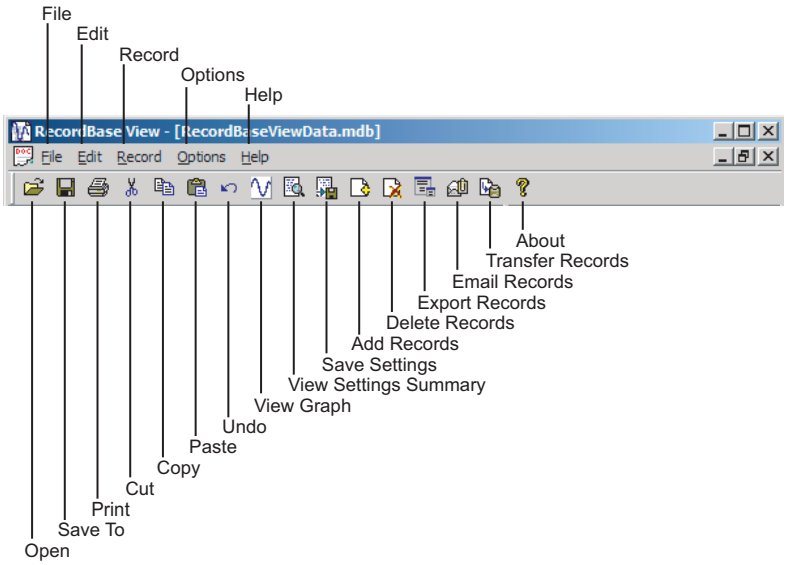


Figure 1.3: Main Menu Tool Bar

Table 1.1: Menus	
Icon	Restore Move Size Minimize Maximize Close Next
File	Open.. opens selected database. Close Print Summary Print Summary Preview Print Record List Print Record List Preview Print Setup .
Edit	Undo Cut Copy Paste
Record	Graph View Settings Summary Save Settings Add
Records	Delete Records Save To Export To COMTRADE Send
Options	Add Record Record Classification

Table 1.1: Menus	
Help	User Manual About RecordBase View

Table 1.2: Toolbar Buttons	
Open	Select a database to open (can be a RecordBase View or a Record-Base Central Station database).
Save To	Highlight a record, then select this option to save the record to folder/ disk.
Print	Prints a record summary of the highlighted record.
Cut	Cuts the highlighted text.
Copy	Copies highlighted text to the clipboard.
Paste	Pastes clipboard text to cursor position.
Undo	Undo the previous cut/copy/paste operation.
View Graph	Select a record(s) from the record list, then select the View Graph button to launch RecordGraph, a tool used to display and analyze records. Alternatively, double-click a record to launch RecordGraph.
View Settings Summary	If Offliner Settings is installed on your system, view the setting file (as read-only) of the selected record using the View Settings tool. Save Settings: Extract the settings from the selected record and save the settings to a file for later use (viewing/editing). If Offliner Settings is installed on your system, use it to view and edit the setting file. Add Records: Adds records to RecordBase. Browse to select a record. Alternatively, drag-and-drop records from Windows Explorer into the RecordBase View window.
Delete Records	Removes selected records from the database.
Export Records	Exports the selected records to different data formats.
Email Records	Emails the selected records.
Transfer Records	Transfers the selected records to a different database.

Add

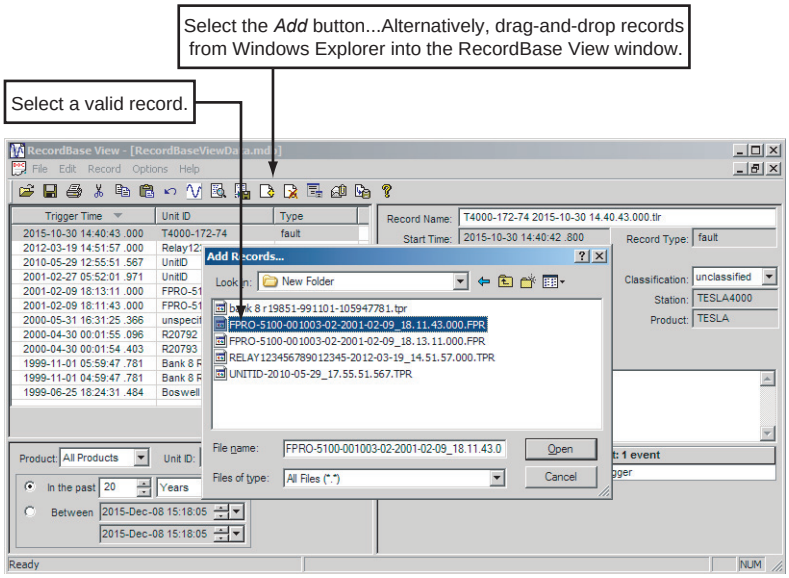


Figure 1.4: Add Records to RecordBase

Select toolbar button *Add* to add records to RecordBase. Browse to select a particular record.

Transfer Records

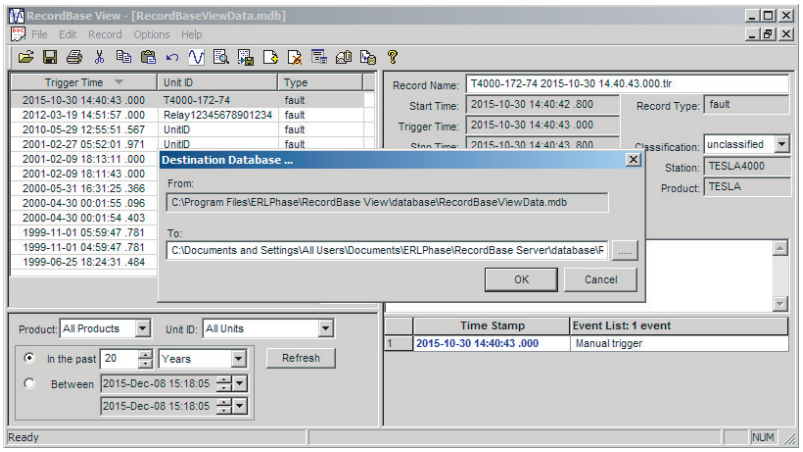


Figure 1.5: Transfer Records

Use this option to transfer records between two distinct database files.

1.3 Components of RecordBase View

Record Search

The bottom portion of the RecordBase window has controls to determine which records are displayed in the list.

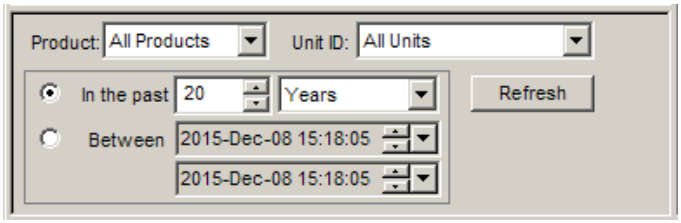


Figure 1.6: Record Search

Table 1.3: Record Search	
Name	**Function**
Product	Choose the product name of the record from the drop-down list.
Unit ID	Limit the record list to a specified set of records.
In the past	Indicates how far back the list should go. For example, if today is Tuesday, January 1, 2001 and you specify "All Units in the past 2 years" then the RecordBase View lists all records dated between Tuesday, January 1, 1999 to Tuesday, January 1, 2001.
Between	Select the time frame of the records to be displayed.
Refresh	Search and update the record list. The search specification is remembered so that the next time you start RecordBase, the last-used search is automatically run and the record list reflects the results.

Record Sort

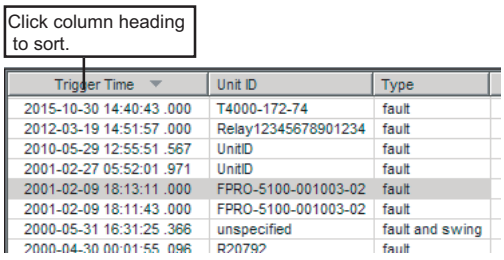


Figure 1.7: Sort by Trigger Time

By default the record list is sorted by Trigger Time, and then by Unit ID which emphasizes when the records occurred. Click the column title to sort the list.

Table 1.4: Record Sort	
Name	**Function**
Trigger Time	Select Trigger Time to sort the list by date beginning with the most toggle the sort order by date.
Unit ID	Select the Unit ID to sort the records by Unit ID and then by Trigger Time, emphasizing where the records are from.
Type	Indicates whether the record contains high-speed transient fault data, low speed dynamic swing data or both.

Record Summary Information

The right side of the screen displays information about the selected record.

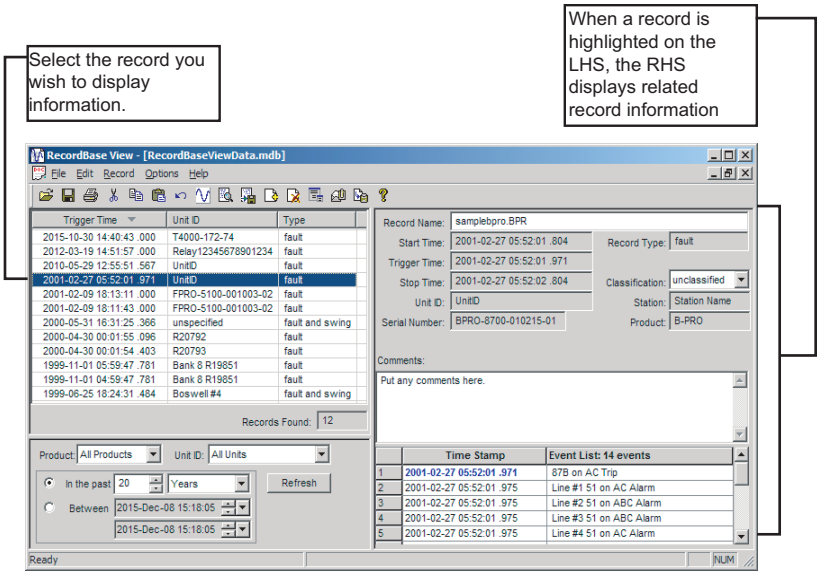
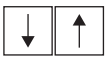

Select the record you wish to display information.
When a record is highlighted on the LHS, the RHS displays related record information
RecordBase View - [RecordBaseViewData.mdb]
File Edit Record Options Help
Trigger Time
Unit ID
Type
2015-10-30 14:40:43 .000 T4000-172-74 fault
2012-03-19 14:51:57 .000 Relay12345678901234 fault
2010-05-29 12:55:51 .567 UnitID fault
2001-02-27 05:52:01 .971 UnitID fault
2001-02-09 18:13:11 .000 FPRO-5100-001003-02 fault
2001-02-09 18:11:43 .000 FPRO-5100-001003-02 fault
2000-05-31 16:31:25 .366 unspecified fault and swing
2000-04-30 00:01:55 .096 R20792 fault
2000-04-30 00:01:54 .403 R20793 fault
1999-11-01 05:59:47 .781 Bank 8 R19851 fault
1999-11-01 04:59:47 .781 Bank 8 R19851 fault
1999-06-25 18:24:31 .484 Boswell #4 fault and swing
Records Found: 12
Product: All Products
Unit ID: All Units
In the past 20 Years
Between 2015-Dec-08 15:18:05
2015-Dec-08 15:18:05
Refresh
Record Name: samplebpro.BPR
Start Time: 2001-02-27 05:52:01 .804
Trigger Time: 2001-02-27 05:52:01 .971
Stop Time: 2001-02-27 05:52:02 .804
Unit ID: UnitID
Serial Number: BPRO-8700-010215-01
Record Type: fault
Classification: unclassified
Station: Station Name
Product: B-PRO
Comments:
Put any comments here.
Time Stamp
Event List: 14 events
1 2001-02-27 05:52:01 .971 87B on AC Trip
2 2001-02-27 05:52:01 .975 Line #1 51 on AC Alarm
3 2001-02-27 05:52:01 .975 Line #2 51 on ABC Alarm
4 2001-02-27 05:52:01 .975 Line #3 51 on ABC Alarm
5 2001-02-27 05:52:01 .975 Line #4 51 on AC Alarm
Ready
NUM

Figure 1.8: Record Summary



Use the up and down cursor keys to move through the list to select a record. Information about the record highlighted is displayed on the RHS.

If multiple records are selected, summary information is unavailable.

Table 1.5: Record Summary	
Name	**Function**
Record Name	Associate a descriptive name with a record. You can edit this text. The text must conform a valid file name (alphanumeric characters, dot '.', underscore '_', minus sign '-', and spaces).
Trigger Time, Start Time, Stop Time	Show the time of the record's first trigger and the time period of data covered by the record.
Unit ID, Station Name	Identify the source of the record — read-only fields. The values come from the Unit ID and Station Name settings in the unit.
Serial Number, Product	Identifies the unit.
Active Group/Setting Group	Indicates group used at the time the record was created. This is only visible for records with multiple setting groups.
Trigger Event and Event List	Portion of the unit's Event Log that occurred during the recorded time period. The event list shows the unit's detector activity such as external digital input state changes and internal analog detector pickups.
User Comments	Editable text field to store comments about the record. These comments are associated with the record and are always displayed with it. The comment field is large (up to 64k). Standard Windows cut and paste functions can be used with the Comments field. (Ctrl + V for paste, Ctrl + C for copy, Ctrl + X for cut.)

View Settings

View Settings opens *Offliner* Settings directly from RecordBase View.

The appropriate *Offliner* has to be installed to view settings.

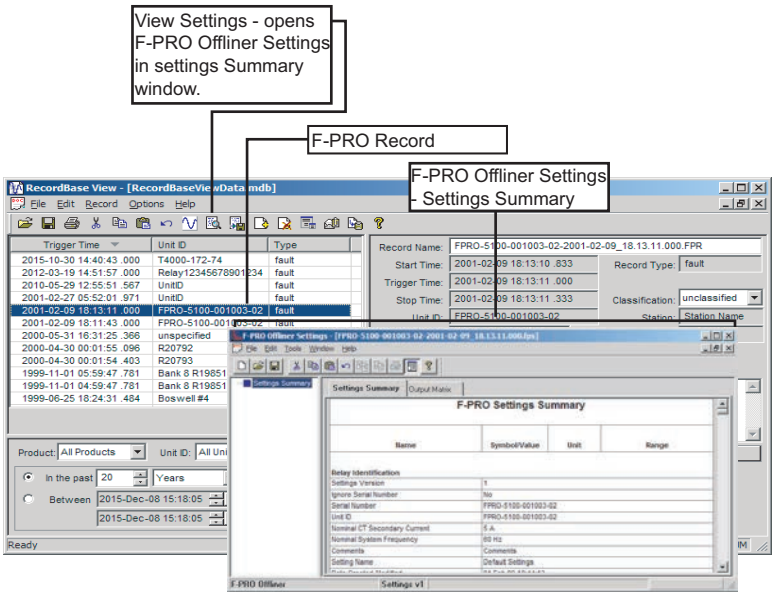


Figure 1.9: View Settings from RecordBase View

Setting Summary

In RecordBase View, select record and the View Setting button to display the Setting Summary in *Offliner*.

If the record contains Setting Groups, the *Offliner* displays all Setting Groups in the summary. Bold text in the tree view indicates an active Setting Group (the Setting Group used at the time the record was captured). The setting summary is read-only. To edit the setting file associated with the summary, you must use File/Save As to save the summary to a file. Then close the summary screen and open the setting file for editing.

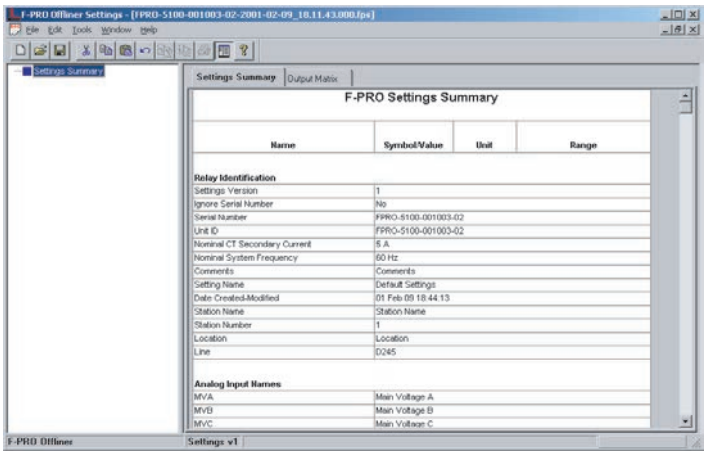


Figure 1.10: View Setting Summary in RecordBase View

Save Settings

Save Settings extracts the relay settings from the record.

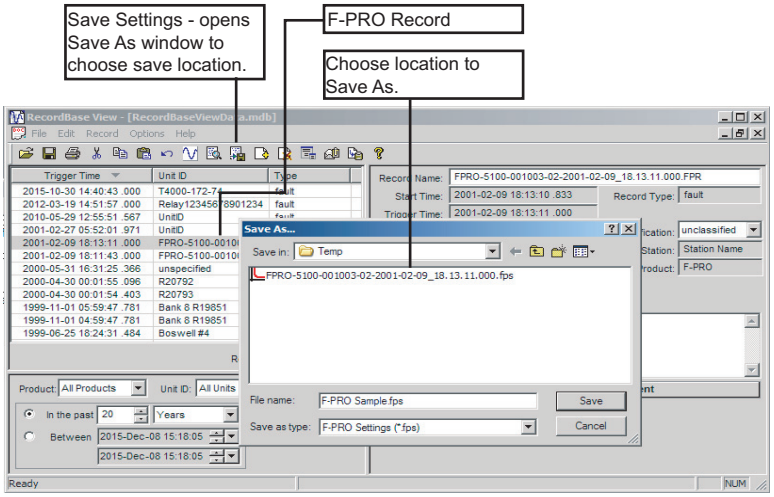


Figure 1.11: Save Settings from RecordBase View

> Note: TESLA configuration files can also be stored in this manner.

Reports

There are two reports available in RecordBase View:

- Record List
- Record Summary

Access reports through the File menu near the top of the window.

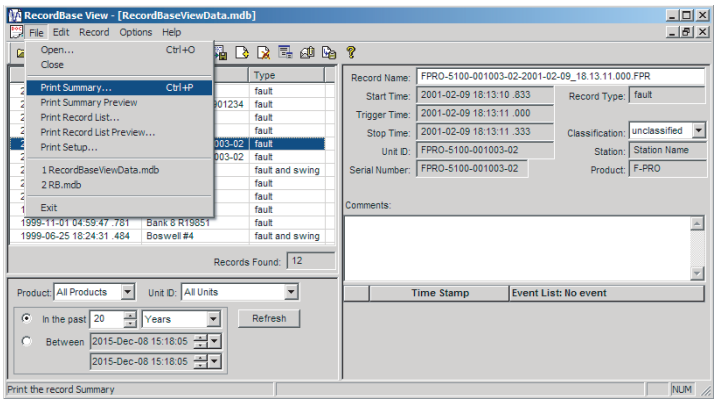
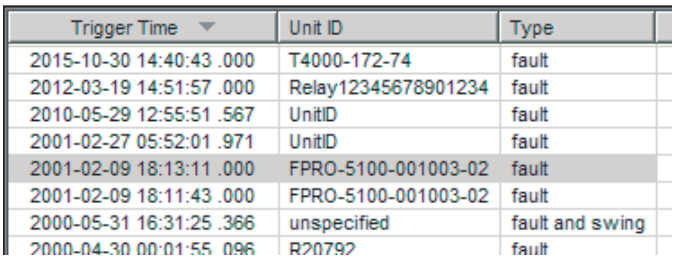


Figure 1.12: Record List Drop Down Menu

Record List



Trigger Time	Unit ID	Type
2015-10-30 14:40:43 .000	T4000-172-74	fault
2012-03-19 14:51:57 .000	Relay12345678901234	fault
2010-05-29 12:55:51 .567	UnitID	fault
2001-02-27 05:52:01 .971	UnitID	fault
2001-02-09 18:13:11 .000	FPRO-5100-001003-02	fault
2001-02-09 18:11:43 .000	FPRO-5100-001003-02	fault
2000-05-31 16:31:25 .366	unspecified	fault and swing
2000-04-30 00:01:55 .096	R20792	fault

Figure 1.13: Record List

A list of the records found by the current search organized like the record list in the main display window, but contains the Record Name field for reference.

Record Summary

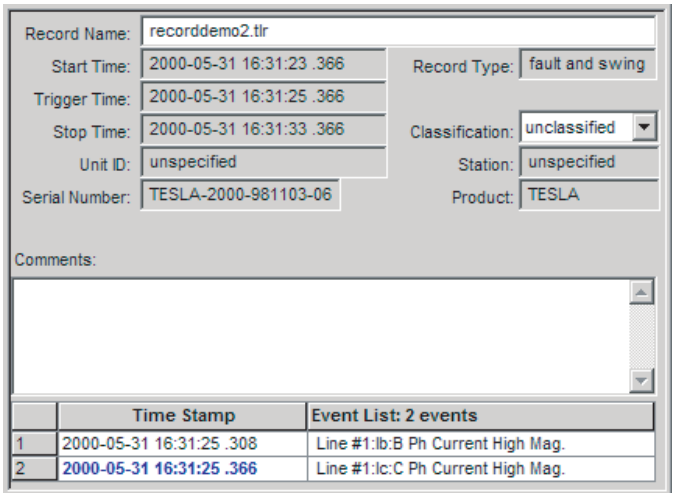

Record Name: recorddemo2.tlr
Start Time: 2000-05-31 16:31:23 .366
Record Type: fault and swing
Trigger Time: 2000-05-31 16:31:25 .366
Stop Time: 2000-05-31 16:31:33 .366
Classification: unclassified
Unit ID: unspecified
Station: unspecified
Serial Number: TESLA-2000-981103-06
Product: TESLA
Comments:
Time Stamp
Event List: 2 events
1 2000-05-31 16:31:25 .308 Line #1:Ib:B Ph Current High Mag.
2 2000-05-31 16:31:25 .366 Line #1:Ic:C Ph Current High Mag.

Figure 1.14: Record Summary

A report of all the information about a single record, including the event list and comments.

To produce summary reports on multiple records:

1. Select multiple records from the record list (i.e. highlight the records you wish to create a report for).
2. Click *File* > *Print Summary*.

The resulting report consists of multiple pages, one for each record. Use the page control at the bottom of the report to display each page.

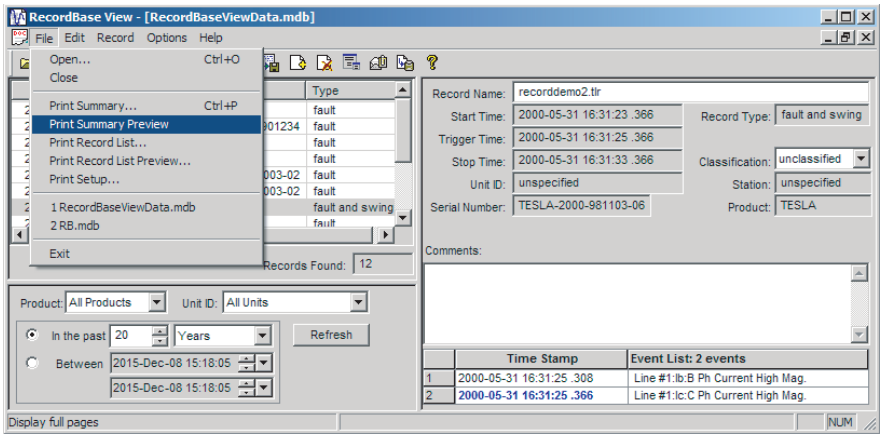


Figure 1.15: Record Summary

The computer must have a default printer defined for the reports to be generated. Refer to your Windows Help for details.

1.4 Viewing Records from Windows Explorer

Use Windows Explorer to add records to RecordBase View database or to view the records graphically without adding them to the database.

1. Start Windows Explorer.
2. Locate the desired record and select them. Multiple records can be selected using the standard Windows Ctrl or Shift keys in conjunction with the left mouse button.
3. Use the right mouse button to bring up the context menu.
4. Select the RecordBase View menu item to activate the sub menu.

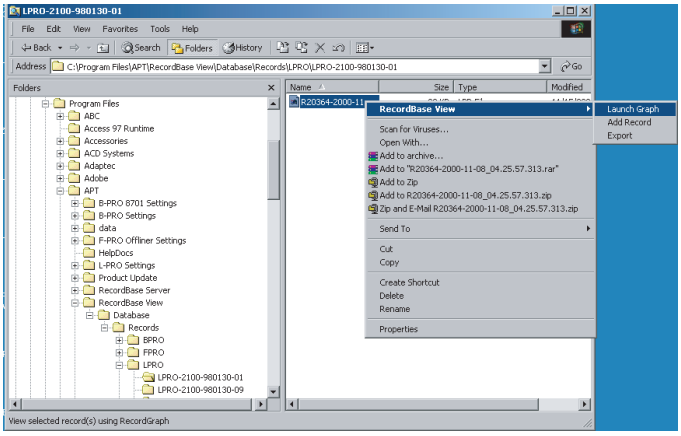


Figure 1.16: Add Record with Windows Explorer

Table 1.6: Add Record with Windows Explorer	
Add Record	Adds the selected record(s) to the RecordBase View database. Note that you can control how records are added, “Add” on page .
Launch Graph	Brings up the graphics display with the selected record(s).
Export	Launches the export utility to convert the selected record to formats such as COMTRADE.

The context menu is shown only for valid record types with the following extensions: *.lpr, *.lpl, *.lpe, *.tpr, *.tpt, *.tlr, *.bpr, *.bpl, *.fpr, *.fpe, *.fpt, *.mbr, *.mbe, *.spr, *.spl, *.spe.

2 Graphing Records

2.1 Getting Started

RecordGraph is a tool that is used to display and analyse records from ERLPhase relays and recorders. Use it to graphically view the data recorded during fault, swing and trend modes. RecordGraph can be launched from RecordBase View software.

RecordGraph Components

- Main menu items
- Tool bar buttons
- A drop-down box lists the templates associated with the current record's IED
- A left-hand side pane (LHS) or tree view lists the names of records to be displayed or analysed
- A right-hand side pane (RHS) displays the graphs in various views. Initially a single blank screen appears.
- A right-click context menu on both the LHS and RHS pane.
- RecordGraph version is displayed in the *Help>About RecordGraph*.

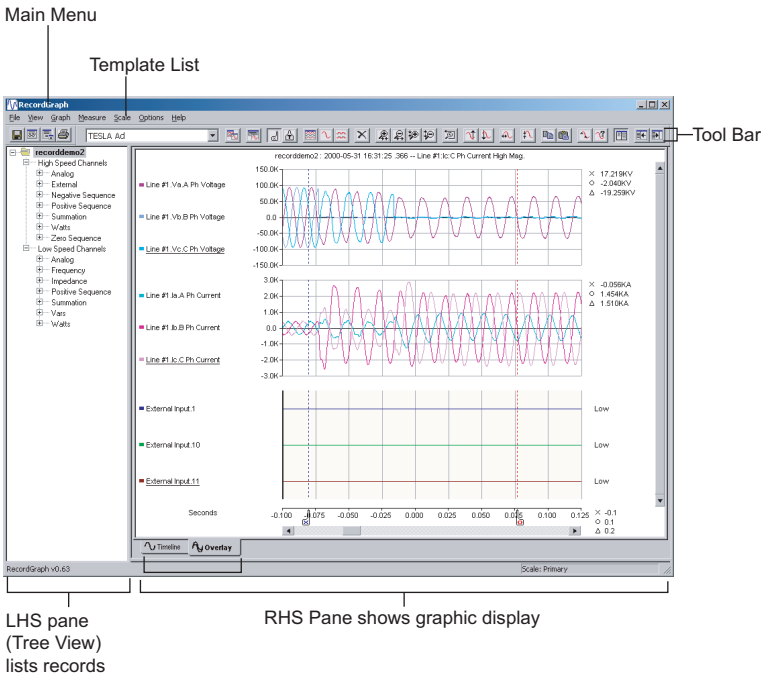


Figure 2.17: Components of RecordGraph Window

Menus

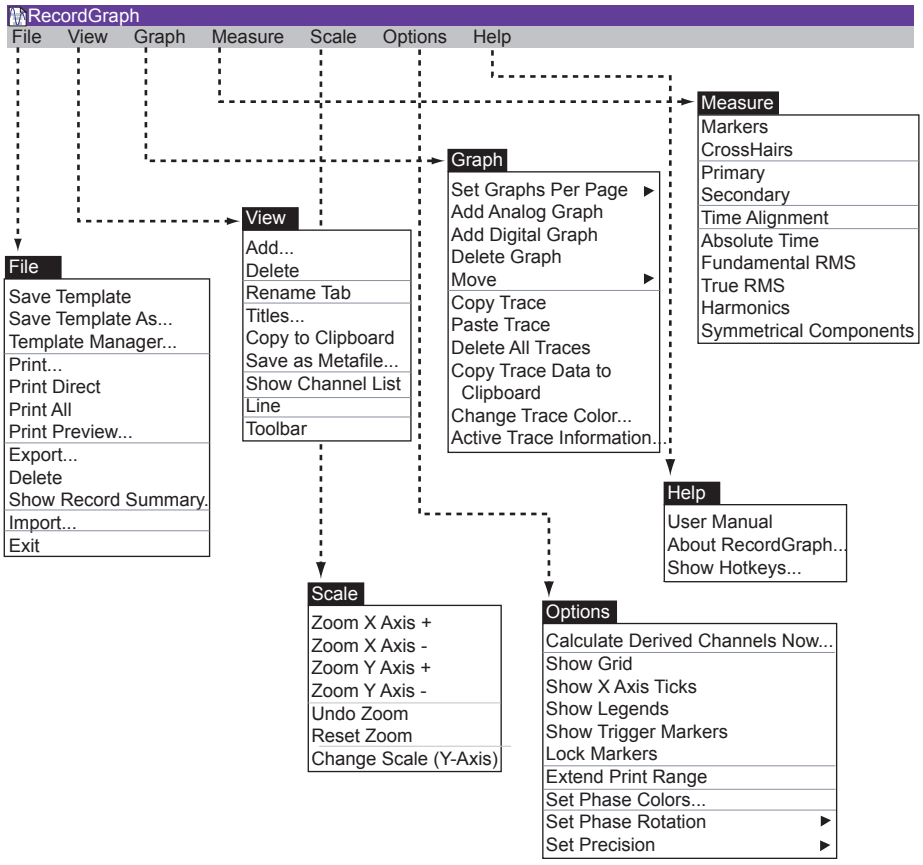


Figure 2.18: Menus

2.2 RecordGraph Menu Items

File Menus

File>Save Template

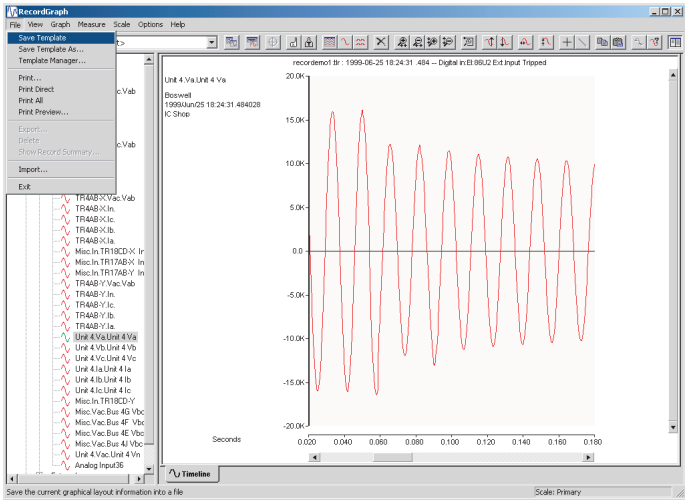


Figure 2.19: Save Template

Use this option to save the current graphical layout information to a file (see “Templates” on page 2-57 for further explanations on templates and their role in graphical analysis).

When this option is chosen and if there are no templates in the template list, then a *Save As Template* dialog box is displayed. Otherwise, the current layout information is saved in a file as shown in the template list box.

File>Save Template As…

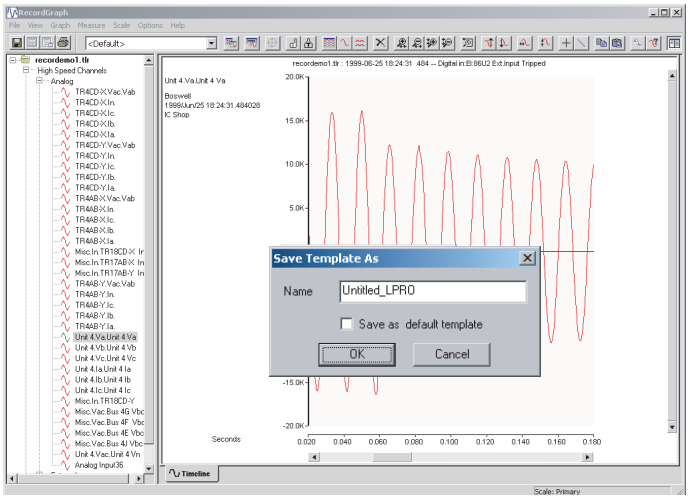


Figure 2.20: Save Template As

Save the current graphical layout information in a different file. A dialog box is displayed to choose the template file name. The check box, save as default template, if checked, saves the current template as a user-defined default template (for more explanation see “Templates” on page 2-57).

File>Template Manager

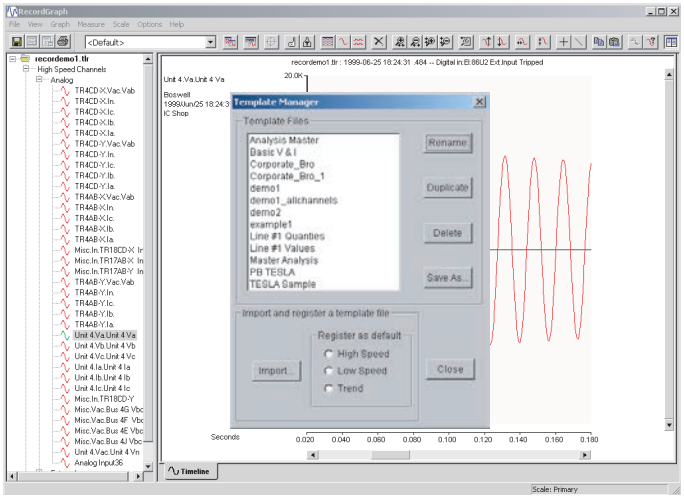


Figure 2.21: Template Manager

Rename, duplicate, save as, import or delete template files. A dialog box is displayed to manage the template files (for more explanation see “Templates” on page 2-57).

File>Print

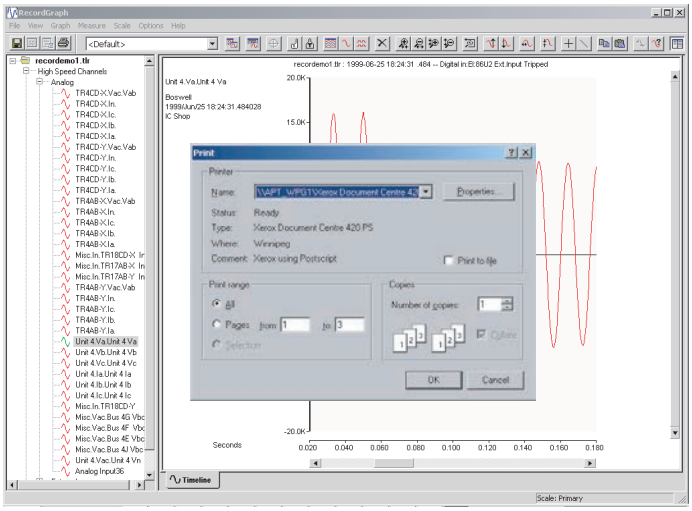


Figure 2.22: Print

Print the active (visible) view. Use this option to select the type of the printer and other configurations associated with it through the standard print dialog box options.

File>Print Direct

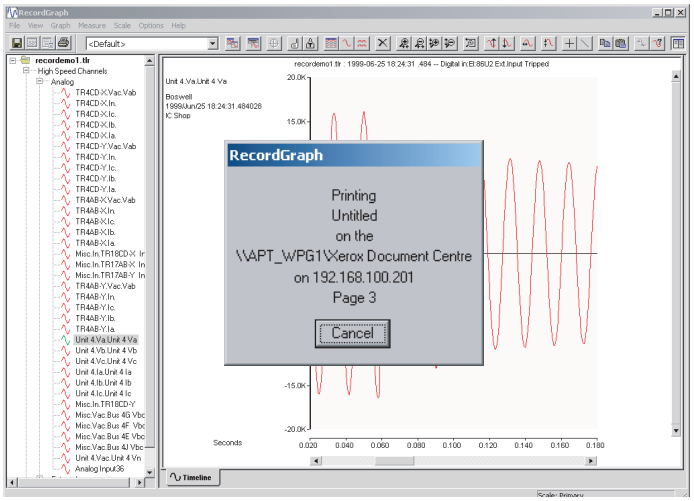


Figure 2.23: Print Direct

Send the active view directly to the default printer. When this option is chosen, the standard print dialog box is not displayed. The active view is sent directly to the default printer for printing, but you can cancel the printing if the print status dialog box is displayed.

File>Print All

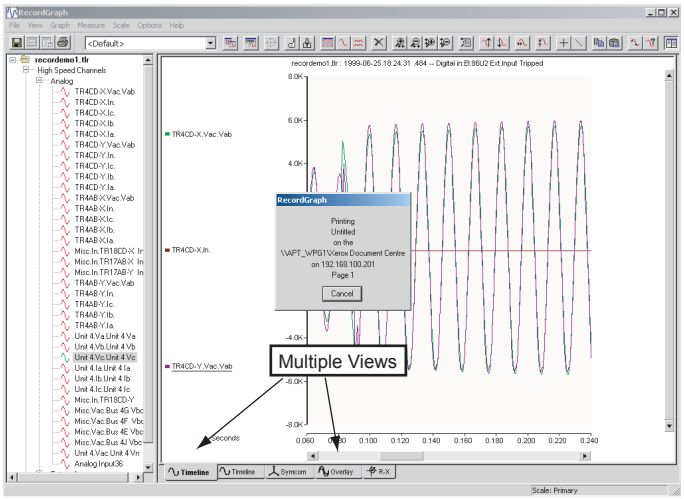


Figure 2.24: Print All

Send all the pages of all the views to the default printer. Select this option to print multiple views (visible and invisible) to the default printer.

File>Print Preview

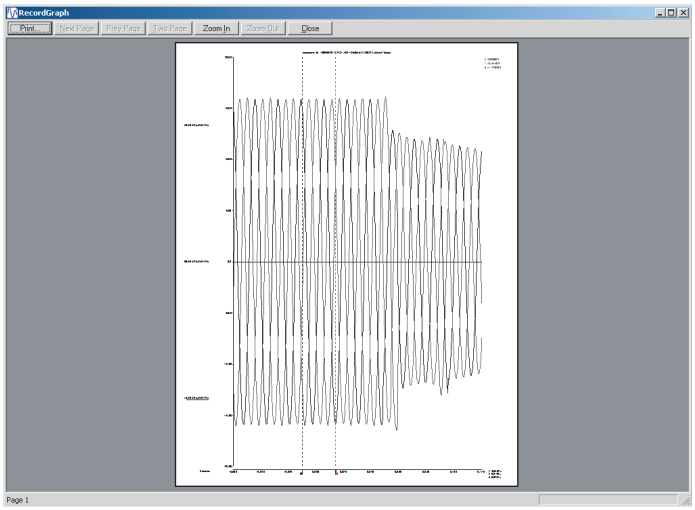


Figure 2.25: Print Preview

Display the print preview window of the active view page.

File>Export

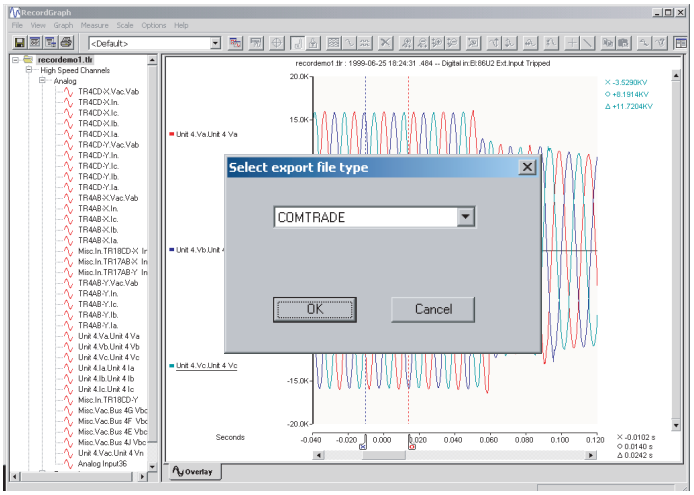


Figure 2.26: Export

Export the selected record to a user-defined format, for more details see “Record Export” on page 3-1.

File>Delete

Delete the currently selected record from the tree view. This option does not clear the view associated with the record.

File>Show Record Summary

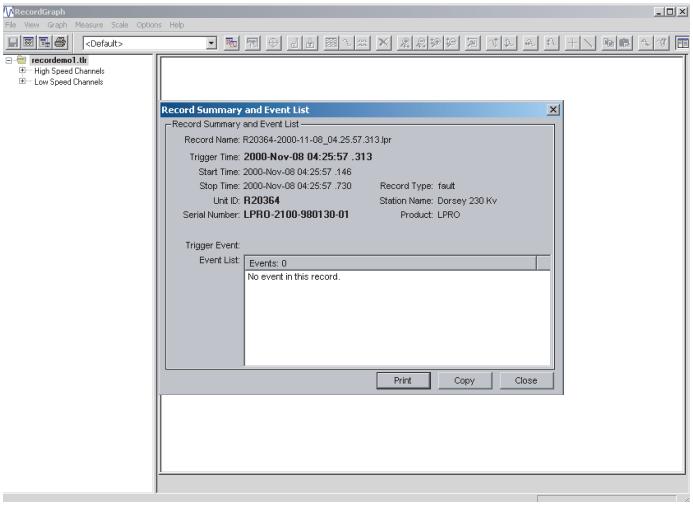


Figure 2.27: Show Record Summary

Display the record summary and the event list of the active record in a dialog box.

File>Import

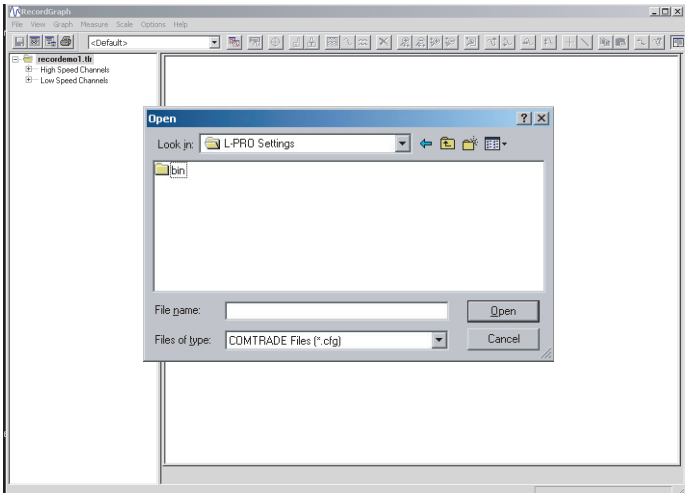


Figure 2.28: Import

Choose this option to import a COMTRADE file and display a standard open file dialog box to select *.cfg COMTRADE files. Alternately, *.cfg and ERL-Phase records may be displayed through a drag-and-drop operation into the RecordGraph application.

File>Exit

Exit the RecordGraph application. Save your graphical layout information before selecting this option.

View Menus

View>Add

Create a new view and add it to the existing layout, for more details refer to “Views” on page 2-30.

View>Delete

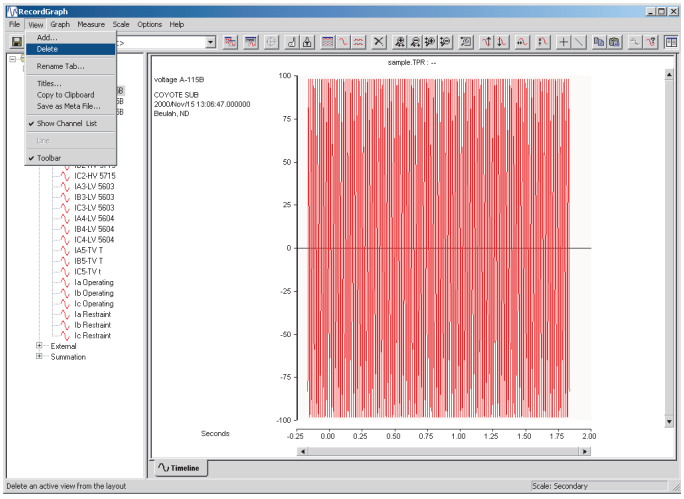


Figure 2.29: Delete

Delete an active view from the layout. When you select this option, a dialog box appears to confirm the deletion of the view. If accepted, the current view is deleted from the layout.

View>Rename Tab

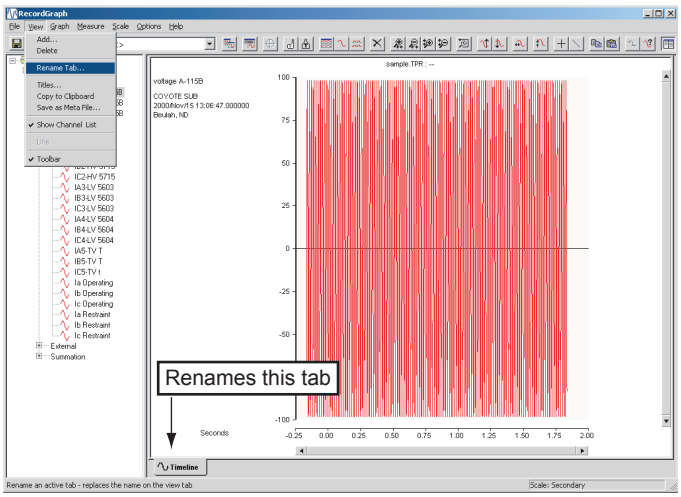


Figure 2.30: Rename Tab

Replaces the name on the active view tab with one of your choice. A dialog box appears to enter the name.

View>Titles

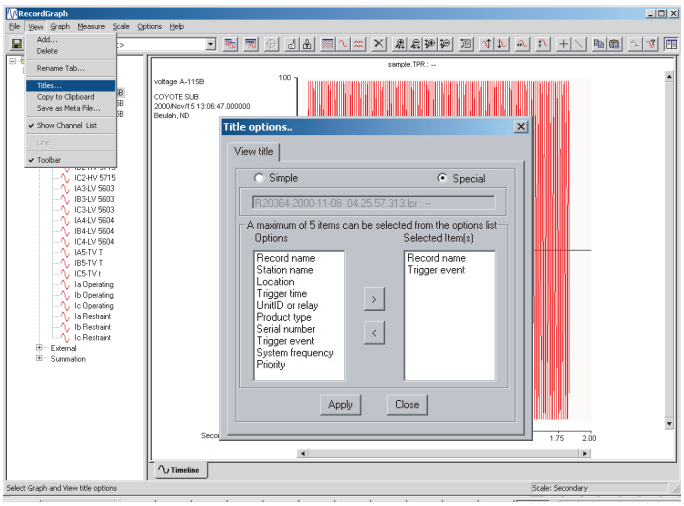


Figure 2.31: Titles

Select graph and view titles options to compile titles and various options, for more details refer to “View and Graph Titles” on page 2-63.

View>Copy to Clipboard

Copy an active view to the clipboard for import to another program such as MS Word or Excel, for more details see “Record Export” on page 3-1.

View>Save As Metafile

Save an active view page as a Windows metafile, for more details see “Record Export” on page 3-1.

View>Show Channel List

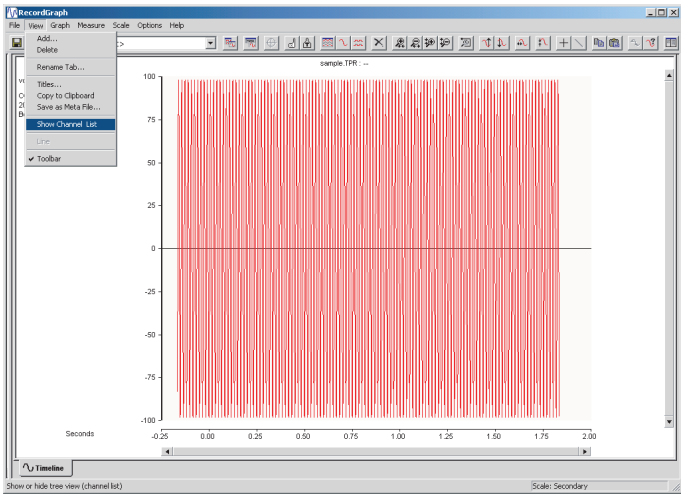


Figure 2.32: Show Channel List

Hide or show the channel list displayed in the tree view.

View>Line

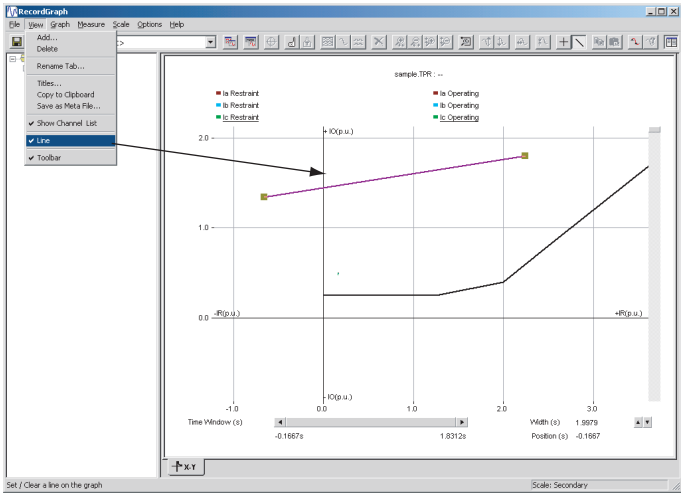


Figure 2.33: Line

Place a reference line on the graph (for Impedance and Differential views only). Use Line in conjunction with the CrossHair measurement for quick readouts. When you choose this option free form zooming is disabled. Clear the line to enable free form zooming.

View>Tool Bar

Show or hide tool bar from the main window.

Graph Menus

Graph>Set Graphs Per Page

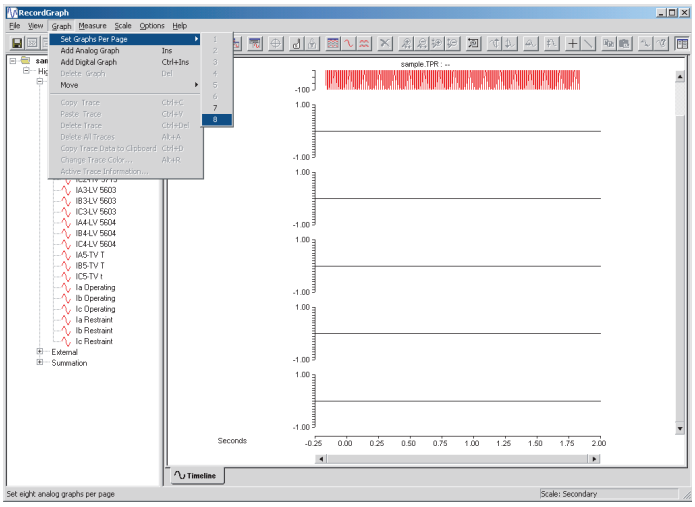


Figure 2.34: Set Graphs Per Page

Set up the number of graphs per view; up to eight graphs are allowed using the Set Graphs Per Page option. Timeline, Overlay and Trend Views allow a maximum of 36 graphs. Use *Add Analog Graph* or the *Insert* key to add one graph at a time.

Graph>Add Analog Graph

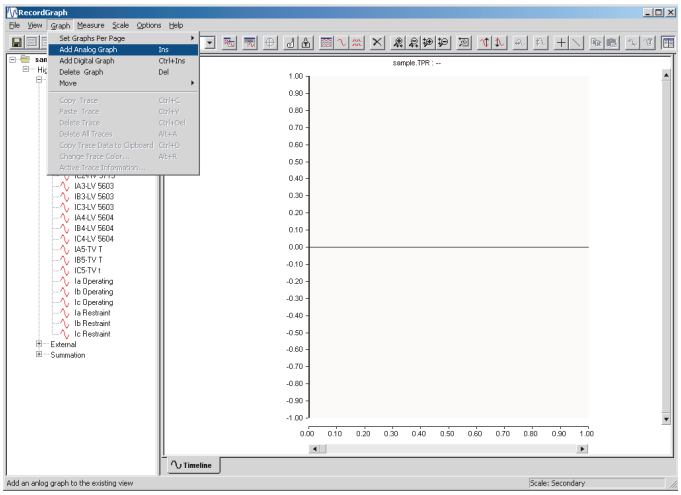


Figure 2.35: Add Analog Graph

Add an analog graph to the existing view or use the *Insert* key.

Graph>Add Digital Graph

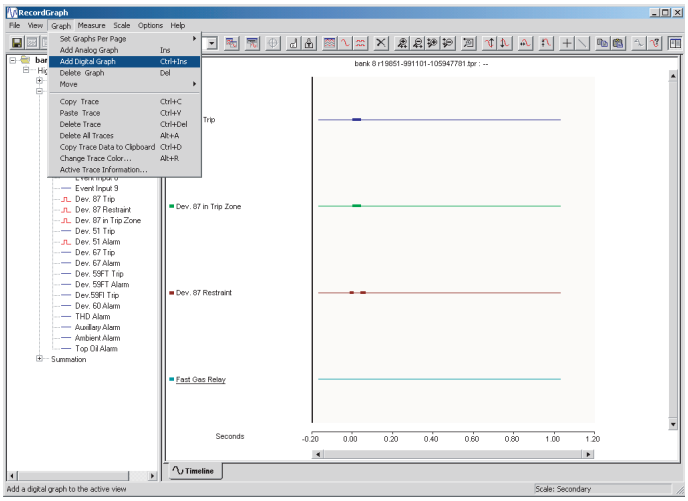


Figure 2.36: Add Digital Graph

Add a digital graph to the existing view. This graph shows the digital status information in the form of thick or thin stacked traces. You can plot up to 32 traces in a single graph.

Graph>Delete Graph

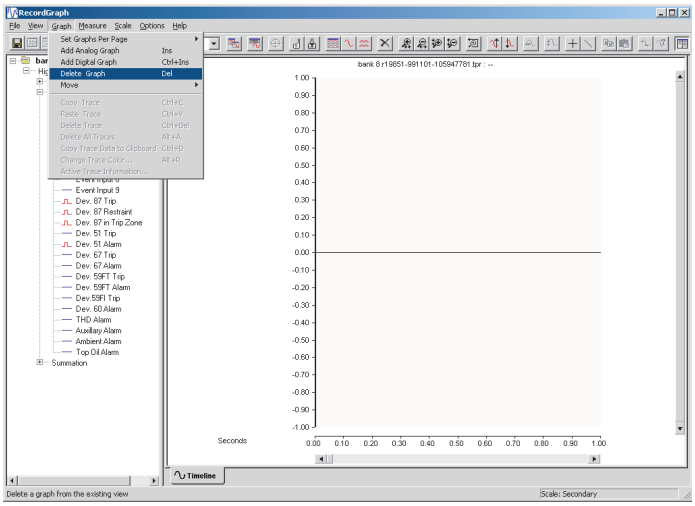


Figure 2.37: Delete Graph

Delete an active graph (click any graph to make it active) from the existing view or use the *Delete* key.

Graph>Move

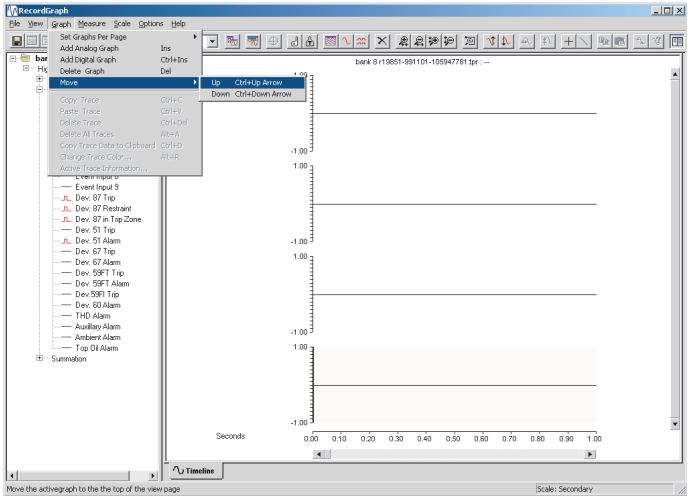


Figure 2.38: Move

Rearrange the relative position of the graphs in the active view page. First select the graph and use either the *Move>Up* or *Move>Down* option to change the position of the graph.

Graph>Copy Trace

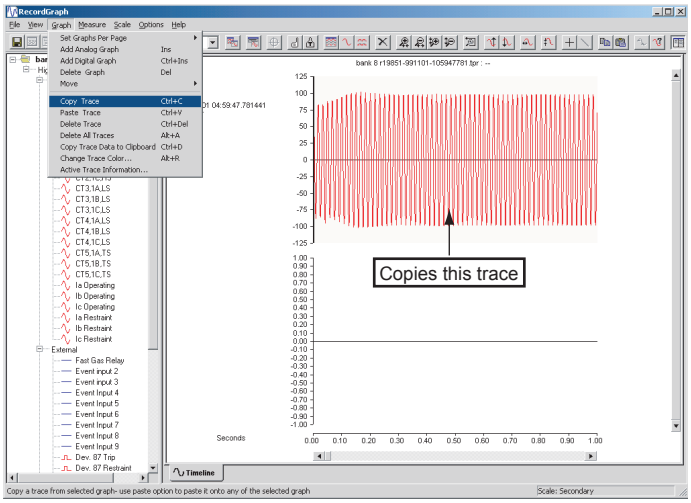

RecordGraph
File View Graph Measure Scale Options Help
Set Graphs Per Page
Add Analog Graph Ins
Add Digital Graph Ctrl+Ins
Delete Graph Del
Move
Copy Trace Ctrl+C
Paste Trace Ctrl+V
Delete Trace Ctrl+Del
Delete All Traces Alt+A
Copy Trace Data to Clipboard Ctrl+D
Change Trace Color... Alt+R
Active Trace Information...
bank 8 r19851-991101-105947781.tpr : --
Copies this trace
Seconds
Timeline
Copy a trace from selected graph- use paste option to paste it onto any of the selected graph
Scale: Secondary

Figure 2.39: Copy Trace

Copy an active trace from the selected graph. Use this option in conjunction with the paste trace option. You need at least one channel on a graph to use the copy operation.

Graph>Paste Trace

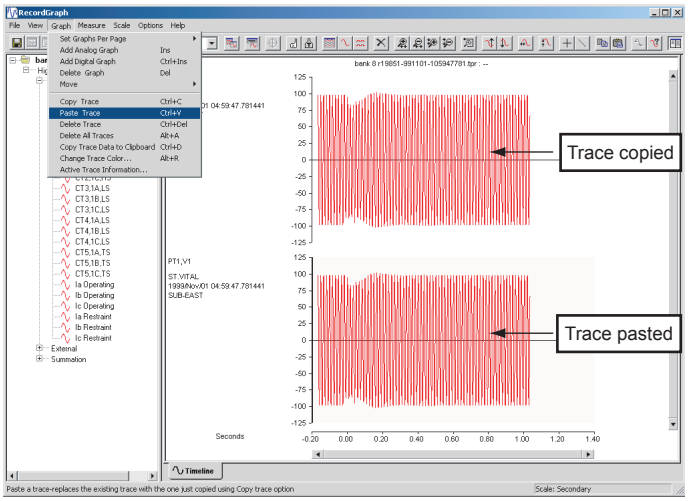


Figure 2.40: Paste Trace

Add or replace an existing trace in the selected graph. In Timeline View an analog graph supports one trace per graph. In an Overlay View you can select up to 32 traces per graph. If you use the paste operation in Timeline View, and if the graph has a trace, it is replaced with the one just copied or adds the trace if there is no trace. In Overlay View it adds the trace to the existing graph.

Graph>Delete Trace

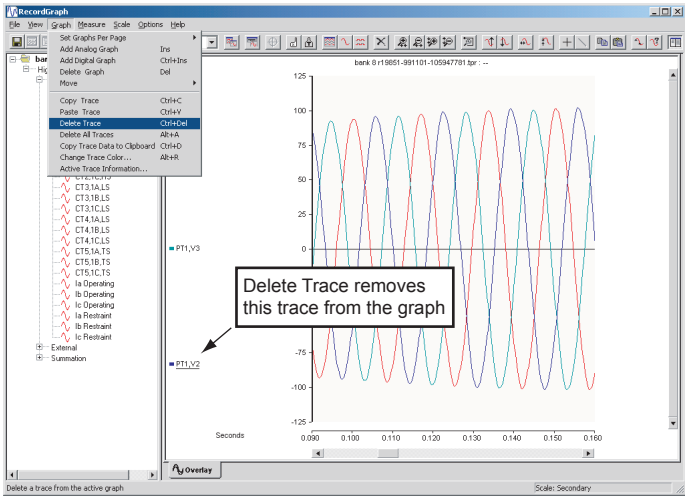


Figure 2.41: Delete Trace

Select a graph and the trace to be deleted and use *Delete Trace* to delete from the active graph. In the case of Overlay View a graph can have multiple traces. You can select a trace by clicking on the channel name and use delete trace option to delete the selected trace.

Graph>Delete All Traces

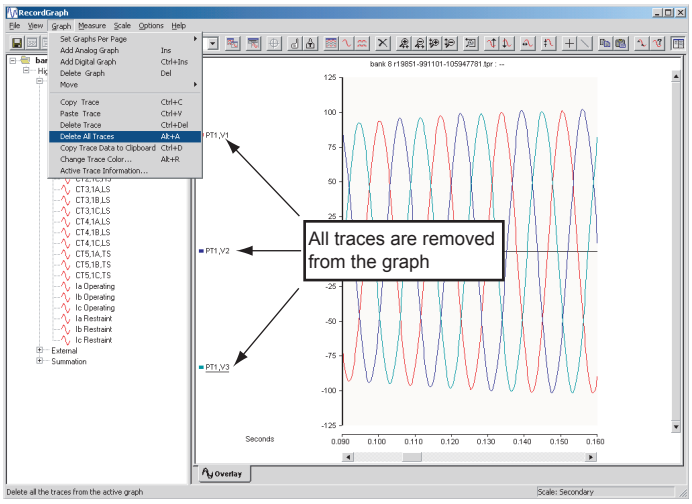


Figure 2.42: Delete All Traces

Deletes all the traces from the active graph. In an Overlay view this action removes all the traces.

Graph>Copy Trace Data to Clipboard

Copy trace data from the active graph to the clipboard, for further explanation see “Exporting Channel Data” on page 2-75.

Graph>Change Trace Color

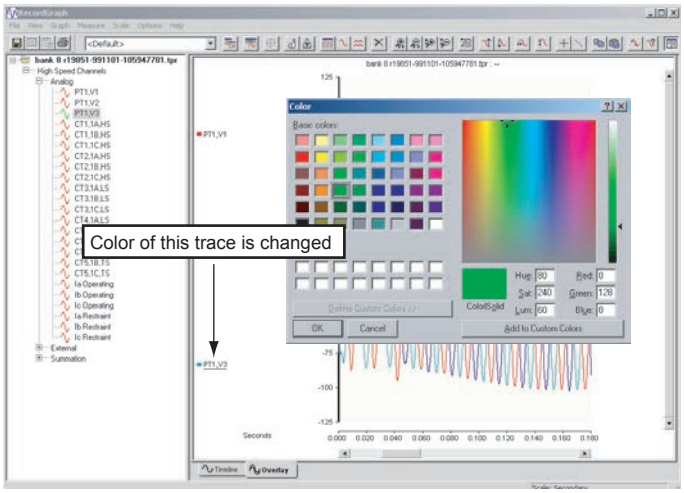


Figure 2.43: Change Trace Color

Change the trace color of the selected trace. In the Overlay View this option only changes the color of the active trace.

Graph>Active Trace Information

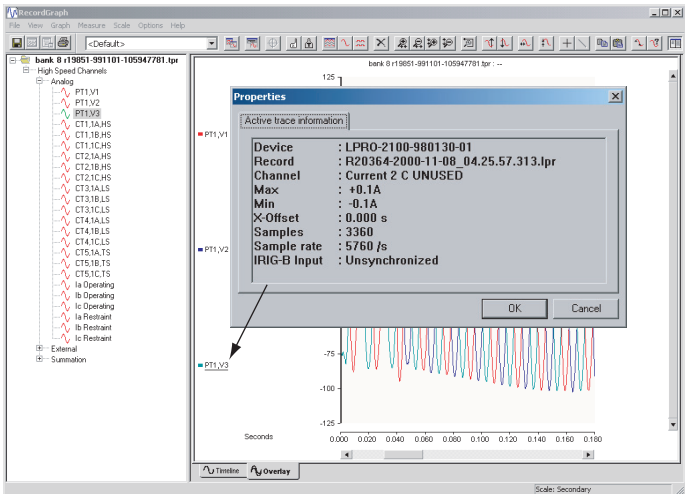


Figure 2.44: Active Trace Information

Display the trace information of the active graph.

Measure Menus

Measure>Markers

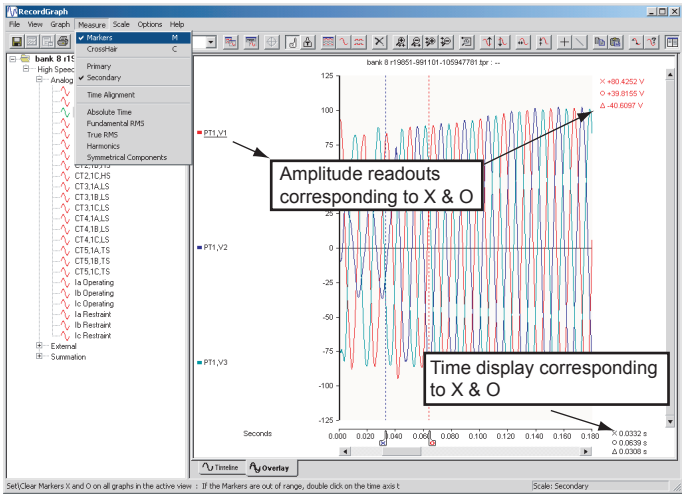


Figure 2.45: Markers

Set or clear markers X and O on all graphs in the active view. If the markers are out of range, double-click the time axis to bring them back into the view. When markers are placed, depending on the type of measurements option, readouts appear on the right hand side as shown corresponding to the positions of X and O marker. In case of multiple traces, the readout refers to the currently active (selected) trace.

Measure>CrossHair

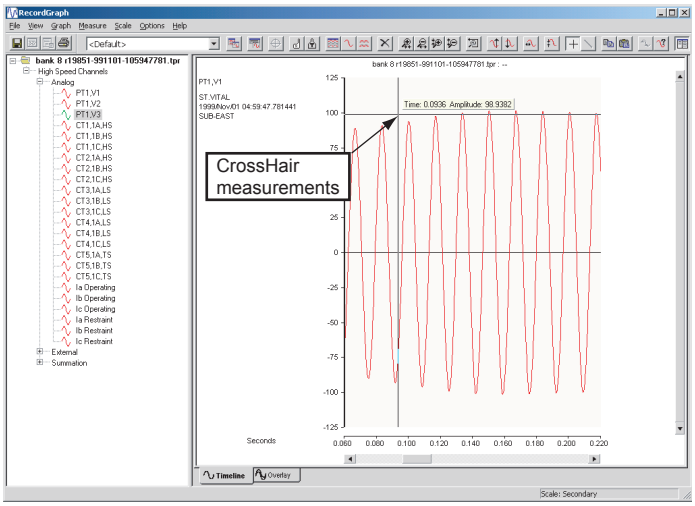


Figure 2.46: CrossHair

Set or clear crosshair cursor measurement by dragging the mouse (left-click and move) anywhere on the graph to display the readout. The difference between the marker and crosshair readout is that the marker values correspond to the data values, whereas the crosshair measurement corresponds to the x and y coordinates. When this option is selected, you can measure coordinates of any graph in the active view.

Measure>Primary

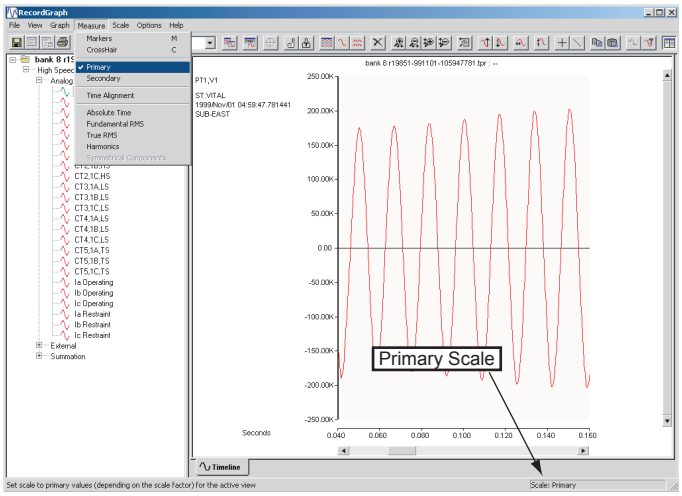


Figure 2.47: Primary

Set scale to primary values (depending on the scale factors CT/PT ratios) on all the graphs in the currently active view. The current choice (primary or secondary) is displayed on the status bar.

Measure>Secondary

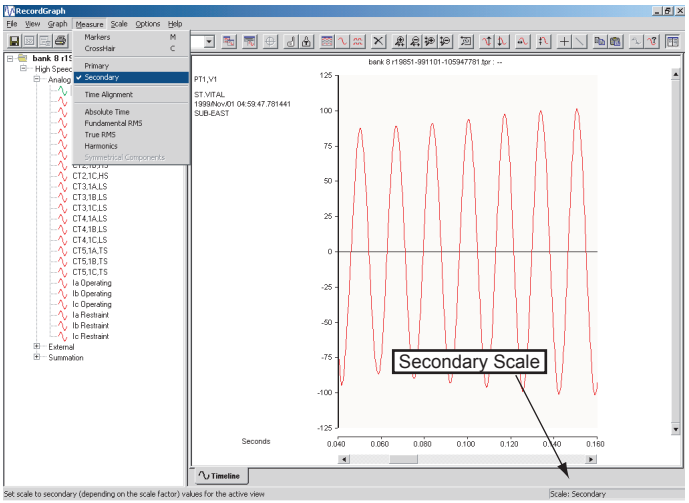


Figure 2.48: Secondary

Set scale to secondary values (depending on the scale factor of CT/PT ratios) on all the graphs in the currently active view. The current choice (primary or secondary) is displayed on the status bar.

Measure>Time Alignment

Offset X axis (trigger time alignment) for the currently active trace on the graph, for more explanation see “Readouts and Measurements” on page 2-65.

Measure>Absolute Time

Display absolute time (actual recorded time) measurements for the active trace of the graph, for more explanation see “Readouts and Measurements” on page 2-65.

Measure>Fundamental RMS

Display fundamental RMS measurement for the active trace of the graph, for more explanation see “Readouts and Measurements” on page 2-65.

Measure>True RMS

Display true RMS measurement for the active trace of the graph, for more explanation see “Readouts and Measurements” on page 2-65.

Measure>Harmonics

Display harmonics measurement – up to 5th order and THD expressed in percent with reference to the fundamental (up to 25 harmonics depending on the sample rate) for the active trace of the graph, for more explanation see “Readouts and Measurements” on page 2-65.

Measure>Symmetrical Components

Display symmetrical components measurement for the active graph.You must select a, b and c phase quantities in Overlay View to enable this option, for more explanation see “Readouts and Measurements” on page 2-65.

Scale Menus

Scale>Zoom X Axis +

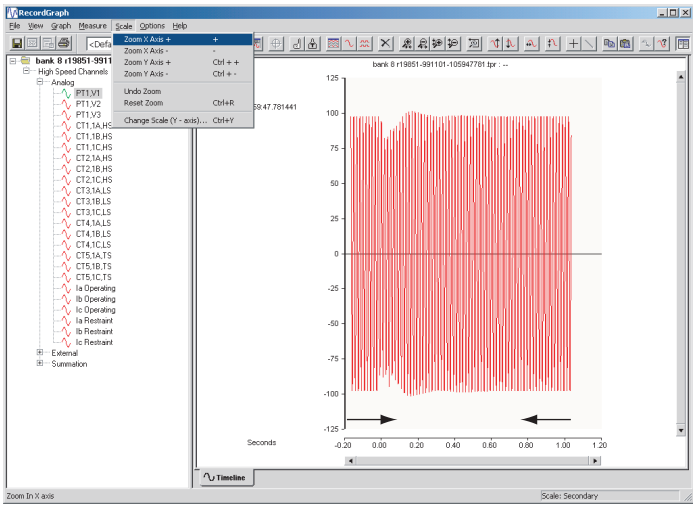


Figure 2.49: Zoom X Axis +

Select this option to decrease the x axis range by 25% of the current zoom range.

Scale>Zoom X Axis -

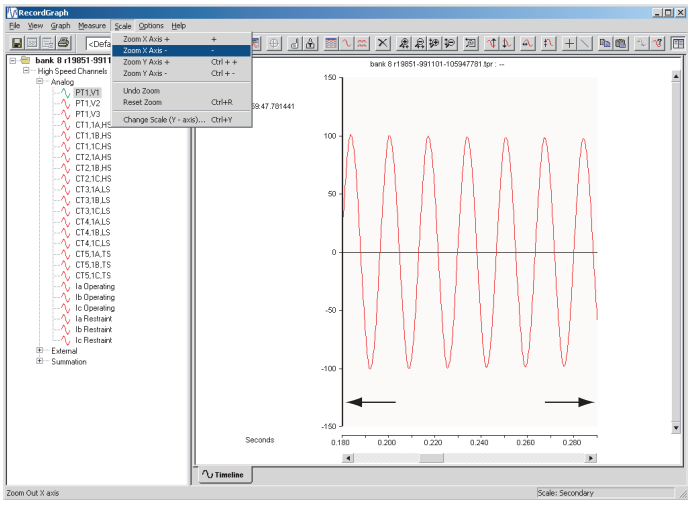


Figure 2.50: Zoom X Axis -

Select this option to decrease the x axis range by 25% of the current zoom range.

Scale>Zoom Y Axis +

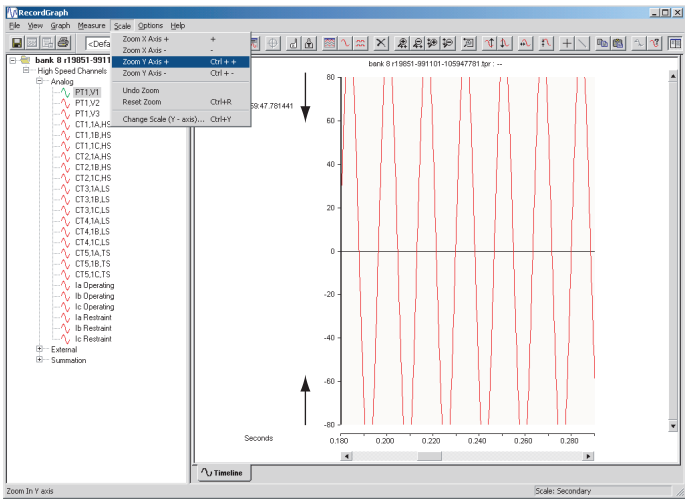


Figure 2.51: Zoom Y Axis +

Select this option to decrease the y axis range by 25% of the current zoom range.

Scale>Zoom Y Axis -

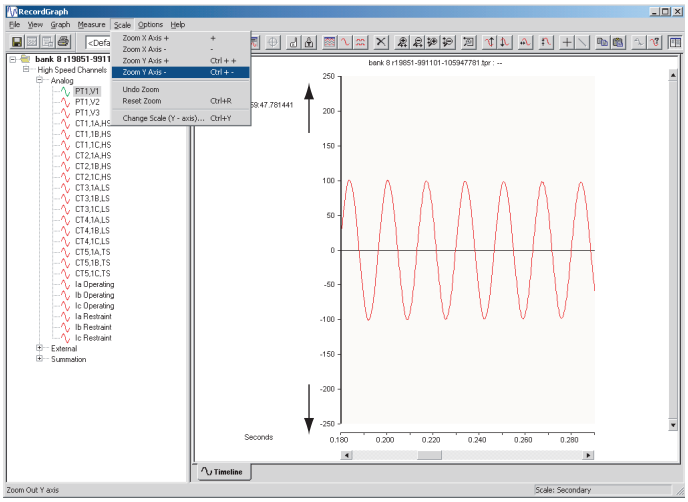


Figure 2.52: Zoom Y Axis -

Select this option to increase the y axis range by 25% of the current zoom range.

Scale>Undo Zoom

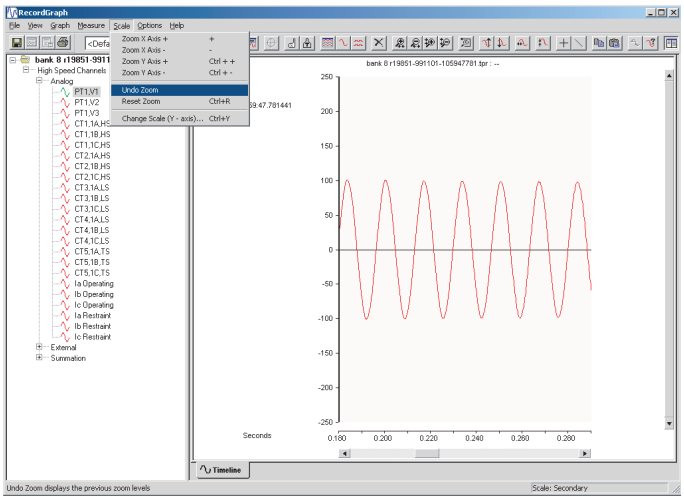


Figure 2.53: Undo Zoom

Display the previous zoom level.

Scale>Reset Zoom

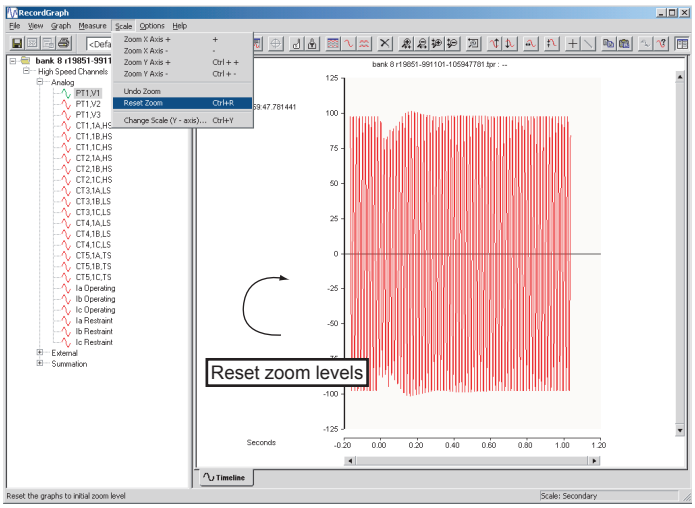


Figure 2.54: Reset Zoom

Reset the graphs to the initial zoom level.

Scale>Change Scale (Y axis)

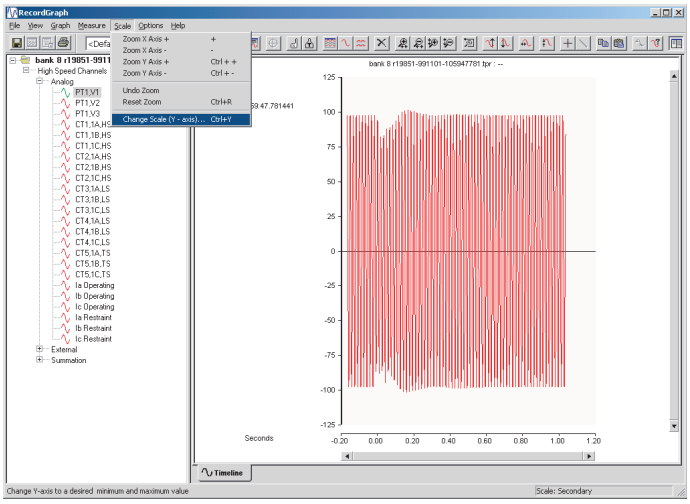


Figure 2.55: Change Scale (Y axis)

Change Y axis to a desired minimum and maximum value using the dialog box to set the new values. If the manual scale option is checked, the y axis is not rescaled to new data values; the trace is displayed within the selected range. You can set the desired scaling, save the options in the template and recall the template for other recordings, for further explanation refer “Templates” on page 2-57.

Options Menus

Options>Calculate Derived Channels Now

Use this option to calculate the derived channels and append to the record as virtual channels. For TESLA records the data is written back to the original record so that the next time the record is viewed all the derived channel information is readily available, for further explanation see “Calculated Channels” on page 2-72.

Options>Show Grid

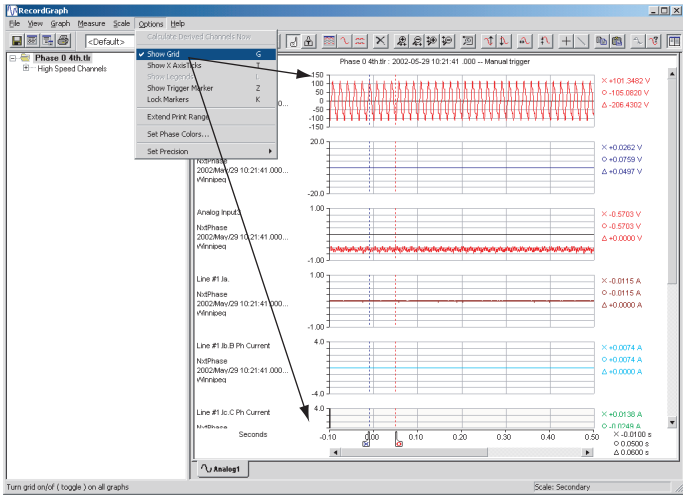


Figure 2.56: Show Grid

Turn grid on or off on all graphs.

Options>Show X Axis Ticks

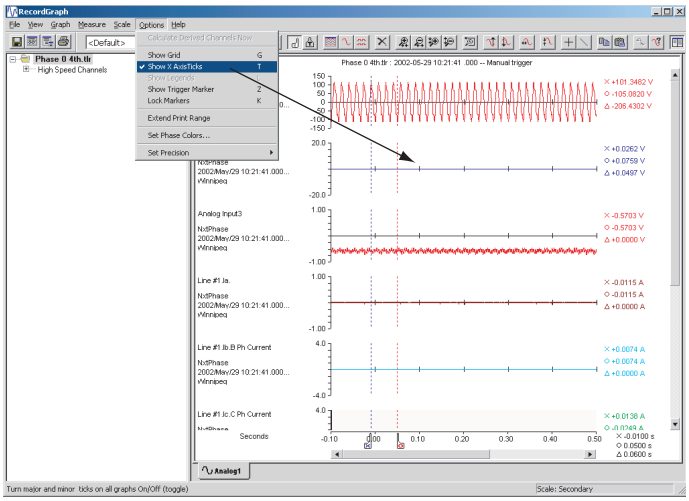


Figure 2.57: Show X Axis Ticks

Show X axis ticks on all graphs.

Options>Show Legends

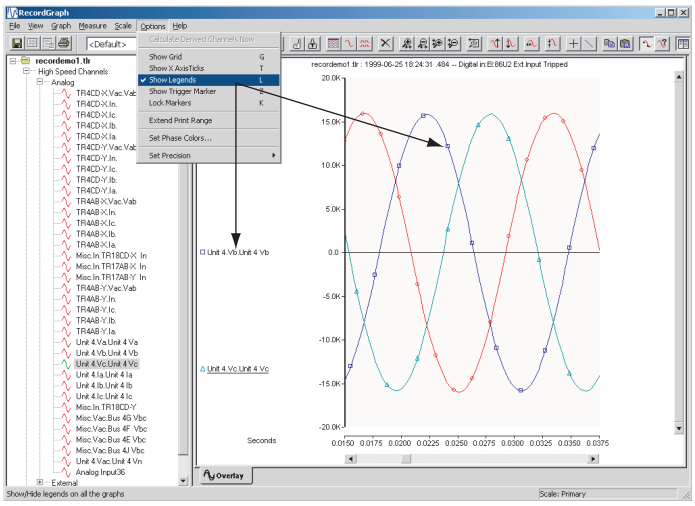


Figure 2.58: Show Legends

Show or hide legends on all the graphs.

Options>Show Trigger Marker

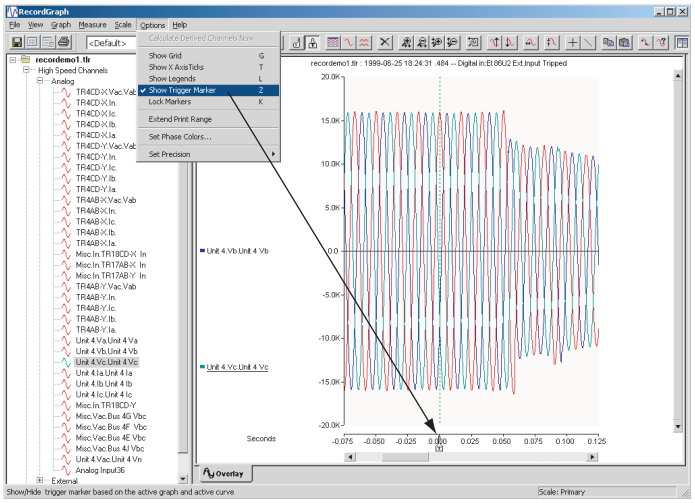


Figure 2.59: Show Trigger Marker

Show or hide trigger marker on the active graph and active curve.

Options>Lock Markers

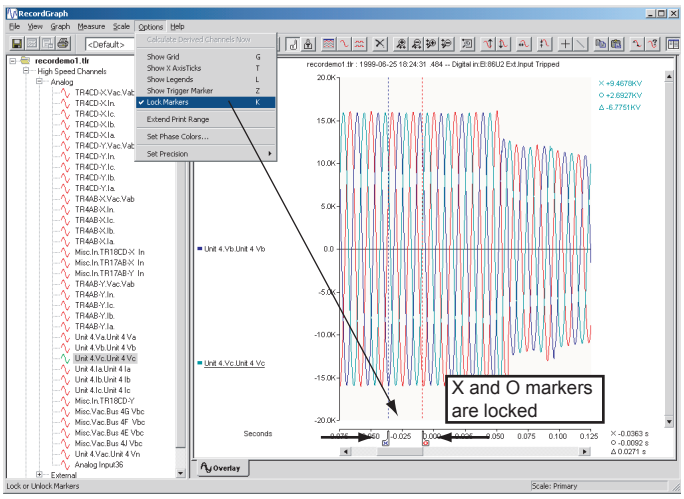


Figure 2.60: Lock Markers

Lock or unlock X and O markers.

Options>Extend Print Range

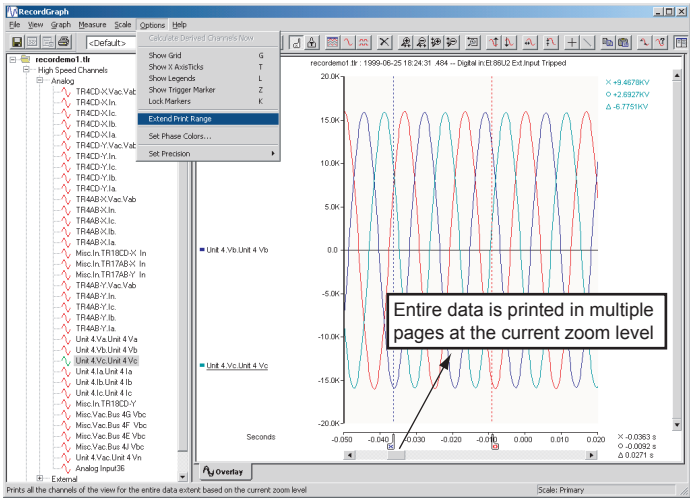


Figure 2.61: Extend Print Range

Print all the channels of the view for the entire data range in the current zoom level.

Options>Set Phase Colors

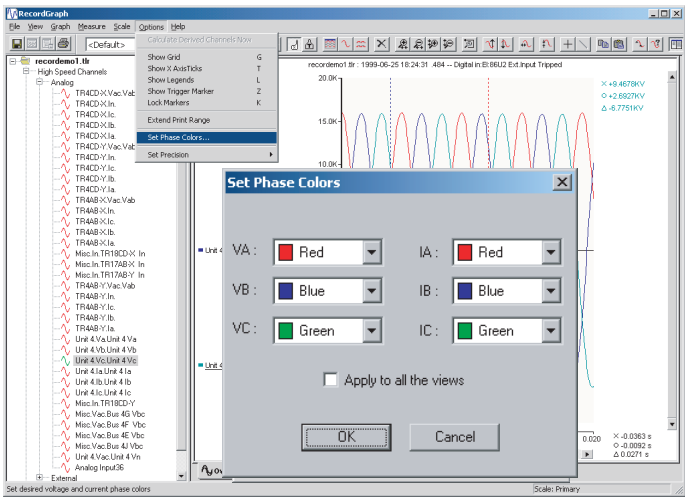


Figure 2.62: Set Phase Colors

Use this option to select user-defined colors for A, B and C phase voltages and currents. When the colors are selected, the channels are automatically identified based on the color. The default values for A, B and C phase quantities are red, blue and green respectively.

Options>Set Phase Rotation

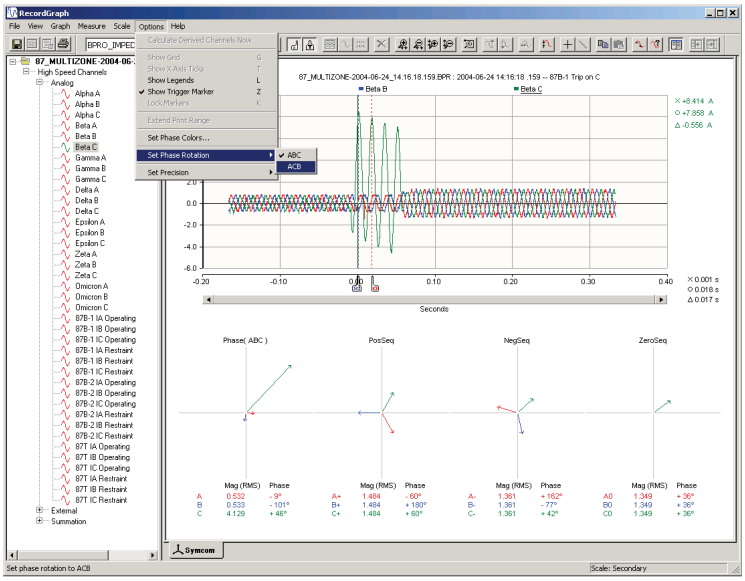


Figure 2.63: Set Phase Rotation

Use this option to select ABC or ACB phase rotation. Note that this is used in Symetrical Component View.

Options>Set Precision

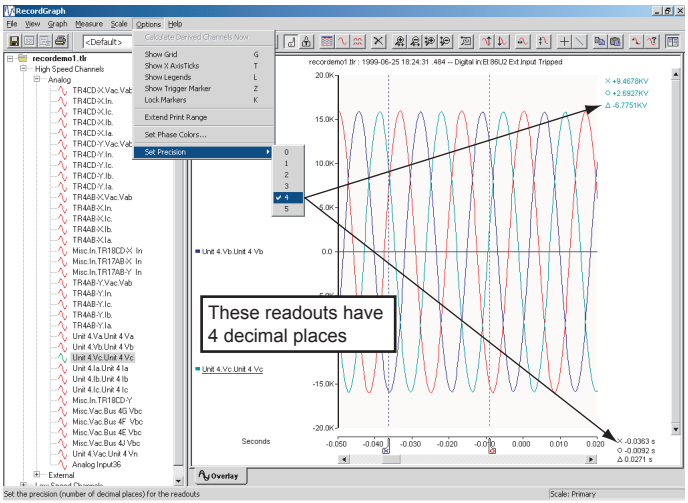


Figure 2.64: Set Precision

Set the precision (number of decimal places) for the readouts. In Symmetrical Component and Harmonic Views, the phase angle readout precision is always zero (no decimal places are used).

Help Menus

Help>User Manual

Select to display an electronic version of the user manual.

Help>About RecordGraph

Display program information, version number and copyright.

Help>Show Hot Keys

Lists the available hot keys or short cuts.

Tool Bar Buttons

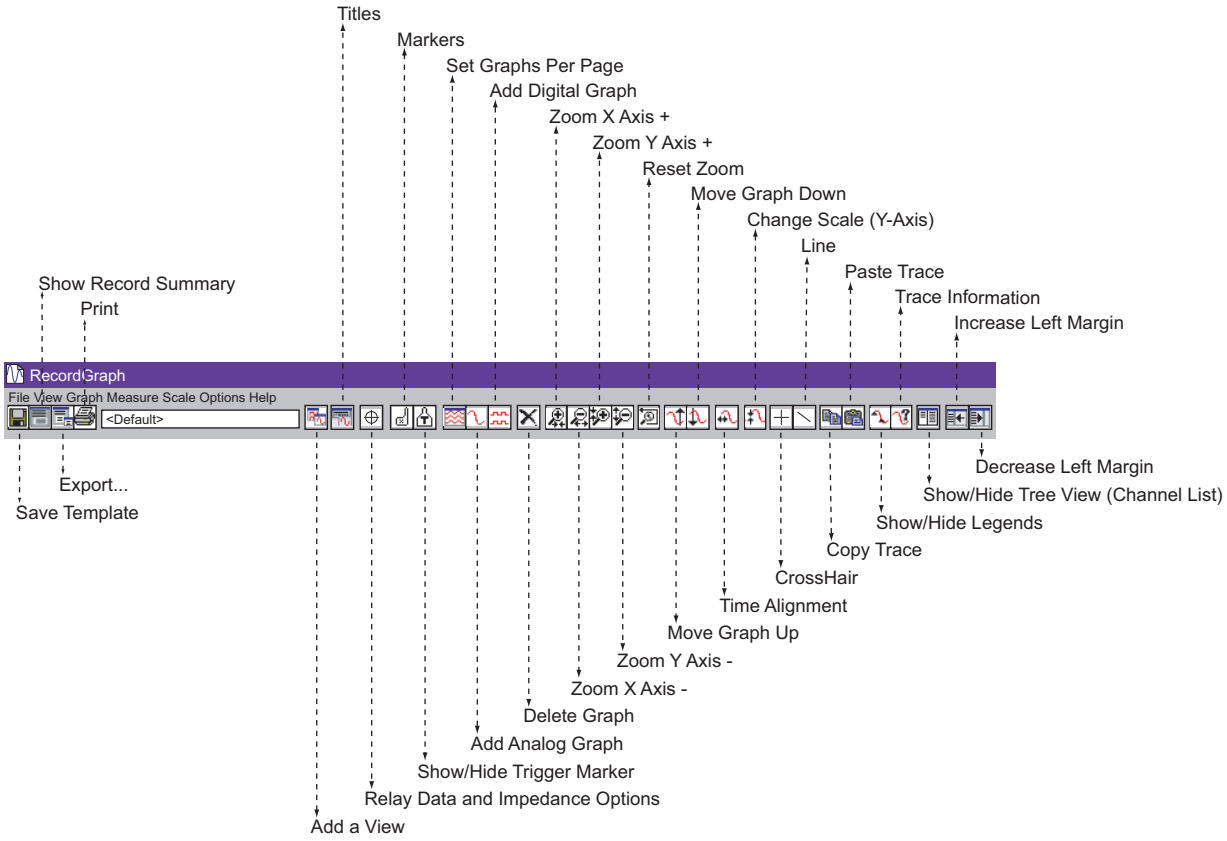


Figure 2.65: Tool Bar Buttons

In the Tree View, you can expand a loaded record to identify the recorded and calculated channels (if configured). A right-click menu is available to manipulate the tree items. Most of the tool bar buttons work in a similar way to that of the menu items explained in the previous sections.

Table 2.1: Tool Bar Buttons

Save Template	Save template file on the disk.
Show Record Summary	Displays record summary (events, trigger time, etc.)
Export	Brings up export module.
Print	Prints record.
Add a View	Adds a graph view that displays the fault information.
Titles	Places a title above graph for all views, “View Title Options” on page 2-64.
Impedance	Creates an R-X plot before, during and after fault.

Table 2.1: Tool Bar Buttons	
Markers	Displays vertical lines "x" and "o" to find the coordinate values on the graph.
Show/Hide Trigger Marker	Displays/hides zero trigger marker.
Set Graphs Per Page	Sets number of graphs per page.
Add Analog Graph	Add an analog graph.
Add Digital Graph	Add a digital graph.
Delete	Delete a graph.
Zoom X Axis +	Enlarges the trace range on X axis.
Zoom X Axis -	Reduces the trace range on X axis.
Zoom Y Axis +	Enlarges the trace range on Y axis.
Zoom Y Axis -	Reduces the trace range on Y axis.
Reset Zoom	Resets zoom control.
Move Graph Up	Vertically moves graph upwards.
Move Graph Down	Vertically moves graph downwards.
Time Alignment	Offset X axis time value.
Change Scale (Y Axis)	Scale Y axis minimum and maximum range.
CrossHair	Displays X and Y coordinate values.
Line	Available only for impedance view, draws a reference line.
Copy Trace	Copies a trace to another location.
Paste Trace	Pastes a trace.
Show/Hide Legends	Displays/hides legends the traces.
Trace Information	Displays/hides channel information: Date, Station Name, RecordName, Channel Name.
Show/Hide Tree View Channel List	Expands and minimizes RHS of the screen.
Decrease Left Margin	Decreases left margin.
Decrease Right Margin	Decreases right margin.

2.3 Views

The view screen graphically displays information from the record. A view is associated with a tab at the bottom of the screen which can be renamed using the Rename tab. You can create a maximum of 15 view tabs.

Add a View

Add new view to layout.

1. Select the *View>Add...* from the top menu bar or the *Add...* button from the tool bar.
2. Select the desired view from the pop-up dialogue box.
3. Click *OK*.

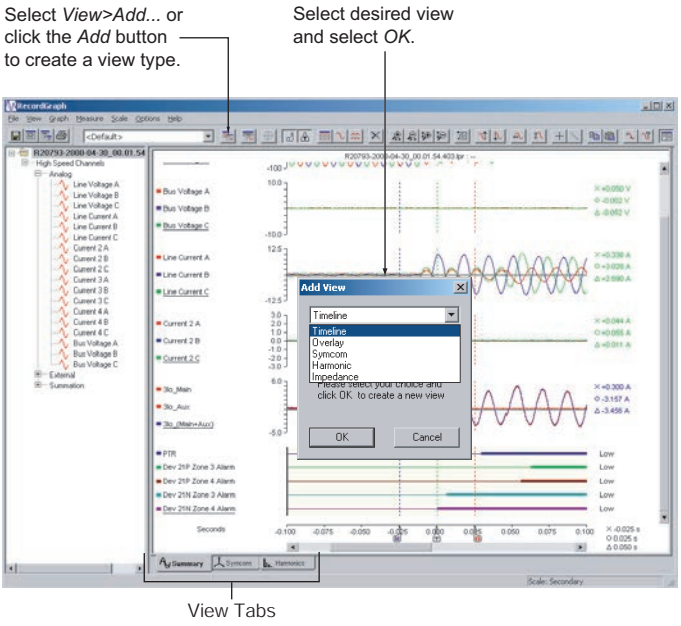


Figure 2.66: Add a View

> The *Add View…* option lists Impedance View only if the selected record is from an L-PRO, TESLA or COMTRADE record.

Delete a View

Clears active view from layout.

1. Select the *View>Delete* from top menu bar. A pop-up window asks you to confirm the deletion.
2. Click *OK* to confirm. Click *Cancel* to stop deletion.

Rename a View

Use this option to rename the active tab which is displayed at the bottom of the view.

1. Select the *View>Rename Tab* from top menu bar or right-click on the graph to bring up the context menu and select *Rename Tab*.
2. A dialogue box appears with the old name. Modify and click *OK* to rename the view.

Figure 2.67: Rename Dialogue Box

Show Channel List

Displays or hides the channel list on the left-hand side of the screen to allow more space for the graphs.

Toolbar

Displays or hides the toolbar on the left-hand side of the screen to allow more space for the graphs.

2.4 Graphs

The graph is an area or space in a view where each channel of analog or digital information is shown. The information is shown as X-Y data with X = time and Y = magnitude.

Adding Graphs

1. Select *Graph>Set Graphs Per Page* or right-click on the graph to bring up the context menu and select *Set Graphs Per Page* to add selected number of graphs to the Timeline View.
2. Select *Graph>Add Analog Graph* or right-click on the graph to bring up the context menu and select *Add Analog Graph* to add an analog graph to the Timeline View.
3. Select *Graph>Add Digital Graph* or right-click on the graph to bring up the context menu and select *Add Digital Graph* to add an digital graph to the Timeline View.

A maximum of 36 graphs (analog and digital) can be created for each Timeline View, Overlay View and Trend View.

Adding Channels

1. Click the desired channel to be displayed on the graph.

   OR

2. Drag a channel and drop it onto the desired graph.
3. Depending on the view type following action takes place:
   - In a Timeline View the existing channel is replaced and only one channel is allowed per graph.
   - In an Overlay View up to 32 traces can be placed per graph.
   - In a Trend View the existing channel is replaced and only one channel is allowed per graph.
   - External or digital channel should be placed on a digital graph to stack the traces. A maximum of 32 traces can be specified per graph.

Channel Tool-tip

When the cursor is moved over the channel name, following information is displayed in the tool-tip window.

- Device – name of the device (example, TESLA)
- Record – name of the record
- Max – channel maximum value along with the unit
- Min – channel minimum value along with the unit
- X – Offset-whether the x-axis has offset (time alignment)
- Samples – number of samples
- Sample rate – samples /second (for trend channels it is seconds per sample)
- Time Sync – time source type and synchronization status

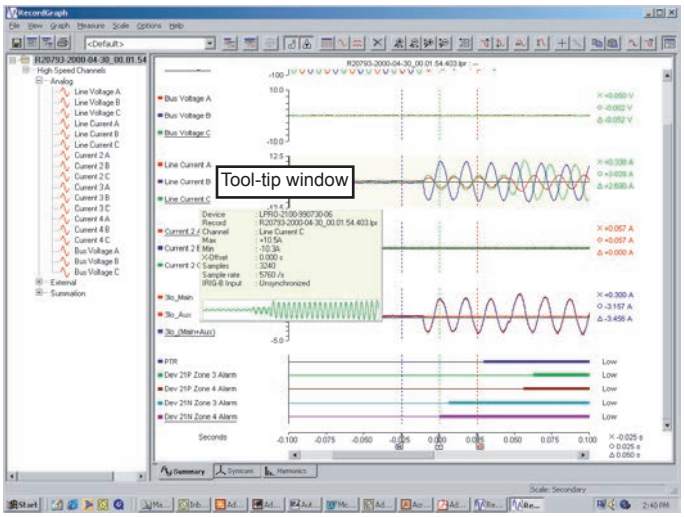


Figure 2.68: Tool-tip

Zoom Using the Mouse

1. Left-click on any graph and drag to form a small box around the graph area.
2. When you release the mouse, the trace assumes new zoom position determined by the area of the zoom coordinates.

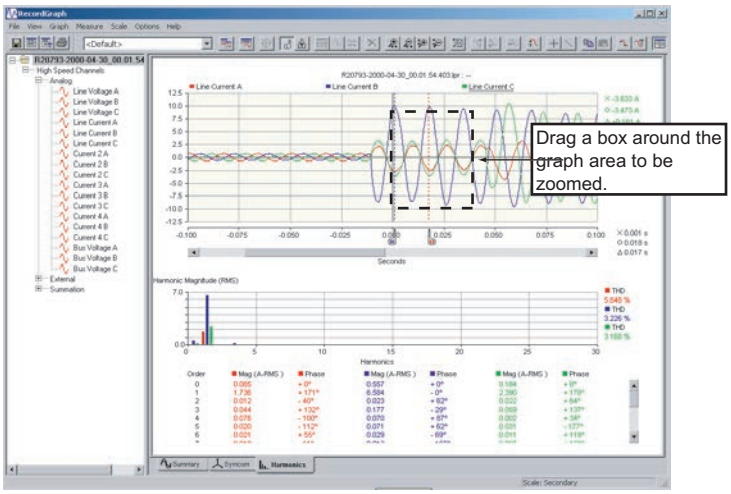


Figure 2.69: Select a Section of the Graph to Zoom

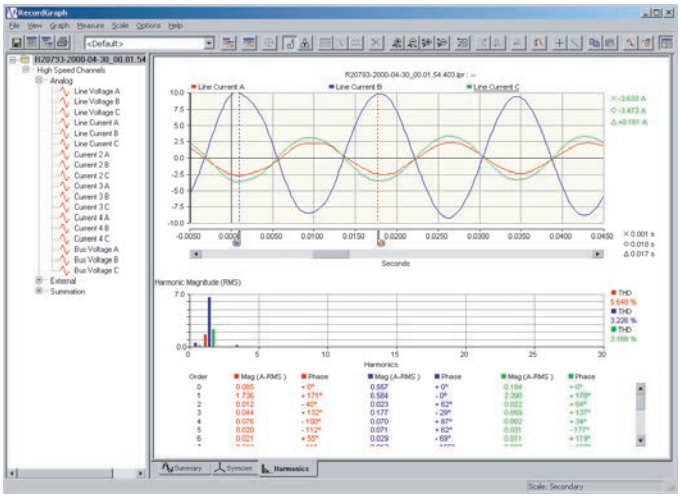


Figure 2.70: Portion of Zoomed Graph

Follow the procedure 1 and 2 for further zooming.

Zoom Using the Tool Buttons

You can also use Zoom X axis +, Zoom X axis -, Zoom Y axis + and Zoom Y axis - on the tool bar buttons to quick zoom in and zoom out (25%).

Repeat step 1 to zoom further.

Zoom only X or Y Axis

To zoom only the X axis, select *Ctrl* key and use the mouse to draw a box on the graph.

To zoom only the Y axis, select shift key down and use mouse to draw a box on the graph.

Undo Zoom on Graphs

1. Right-click on the graph to the context menu.
2. Select the *UndoZoom* option.
3. Graphs are redrawn to the previous zoom level.
4. Select *Reset Zoom* option to reset the graphs to the initial zoom level. This can be chosen at any stage.

Pan Graph

Zoom the graph (if not zoomed) to a required zoom level.

You should hold the “Thumb track” and move it along the scroll bar. To have fine control click on the right arrow scroll bar button or press Ctrl and click on the right arrow scroll button.

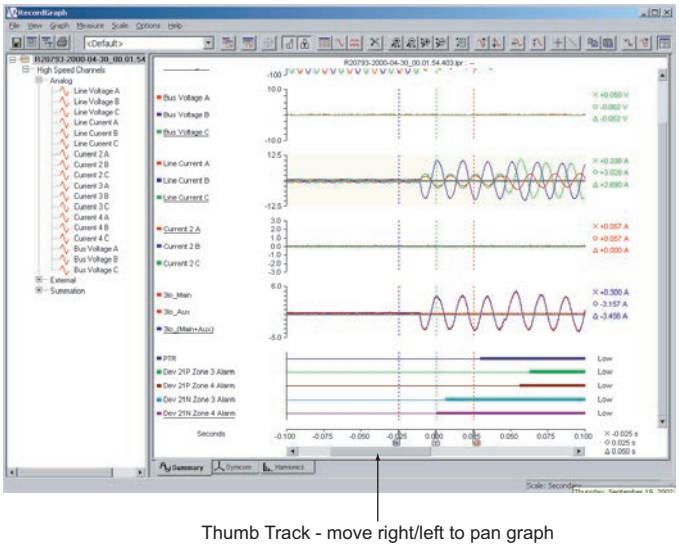


Figure 2.71: Thumb Track

Keyboard Functions

The keyboard is also available for zooming, setting markers and positioning graphs. To display the keyboard hot key menu right-click on the graph and bring up the context menu, select *Show Hotkeys* option.

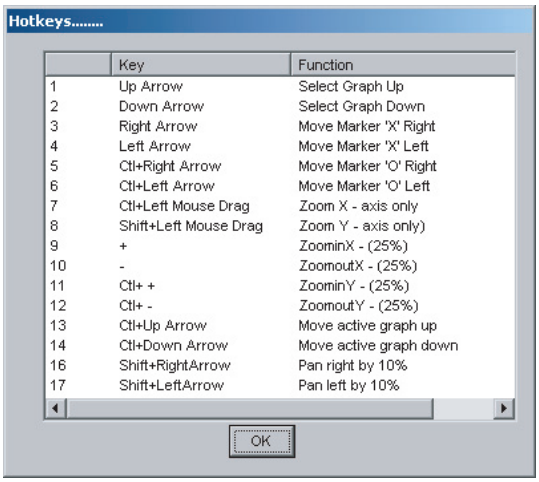

Hotkeys.....
Key
Function
1 Up Arrow Select Graph Up
2 Down Arrow Select Graph Down
3 Right Arrow Move Marker 'X' Right
4 Left Arrow Move Marker 'X' Left
5 Ctl+Right Arrow Move Marker 'O' Right
6 Ctl+Left Arrow Move Marker 'O' Left
7 Ctl+Left Mouse Drag Zoom X - axis only
8 Shift+Left Mouse Drag Zoom Y - axis only)
9 + ZoominX - (25%)
10 - ZoomoutX - (25%)
11 Ctl+ + ZoominY - (25%)
12 Ctl+ - ZoomoutY - (25%)
13 Ctl+Up Arrow Move active graph up
14 Ctl+Down Arrow Move active graph down
16 Shift+RightArrow Pan right by 10%
17 Shift+LeftArrow Pan left by 10%
OK

Figure 2.72: Hot Keys

Right-click Context Menu

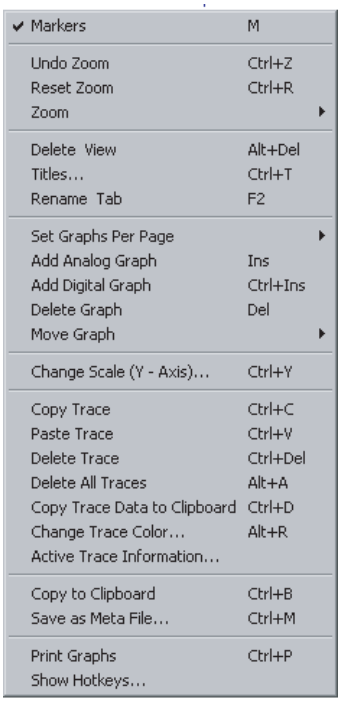


Figure 2.73: Right-click Context Menu

Timeline View

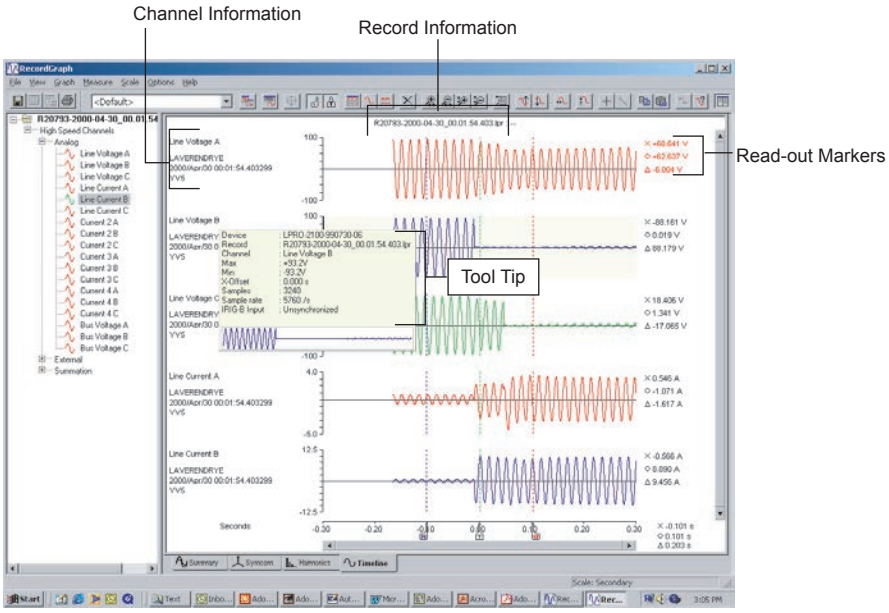


Figure 2.74: Timeline View

- Timeline View is designed to “stack” channels and has single time line axis common for all the graphs.
- Each analog graph in this view can hold only one trace.
- Each digital graph in this view can hold 32 traces (8 traces are preferred).
- Selecting a channel from the LHS tree view while the same graph is active replaces the existing channel with the currently selected one.
- A maximum of 32 graphs (analog and digital) can be added per view.
- You can mix and match channels from different records and/or IEDs.
- Time line view displays read-out (if markers are on) on the RHS and channel information on its LHS.
- Read-out corresponds to the currently selected channel type and the scale (primary/secondary) which is displayed on the status bar.

Overlay View

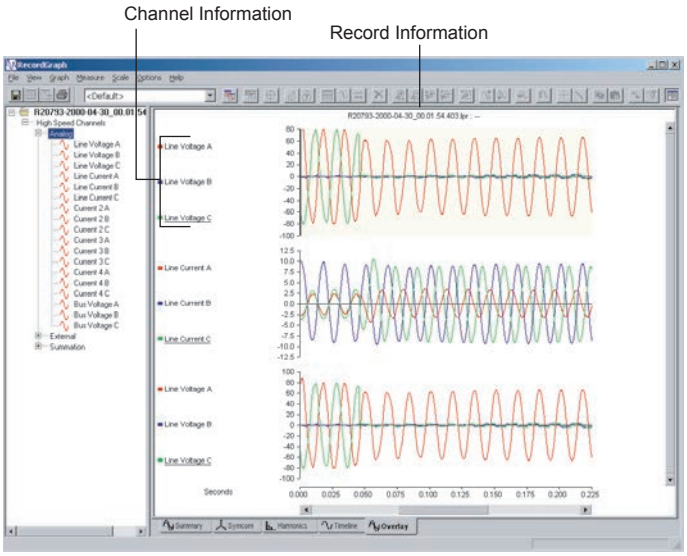


Figure 2.75: Overlay View

- Overlay View is designed to “overlay” channels and has single time line common axis for all the graphs.
- Each analog graph in a overlay view can hold 32 traces.
- Each digital graph in this view can hold 32 traces (8 traces are preferred).
- Selecting a channel from the LHS tree view while the same graph is active overlays the channel on the selected graph.
- A maximum of 32 graphs can be added per view.
- You can mix and match channels from different records and/or IEDs. Time line view displays read-out (if markers are on) on the RHS and channel information on its LHS.
- Read-out corresponds to the currently selected channel type and the scale (primary/secondary) which is displayed on the status bar.

Symcom View

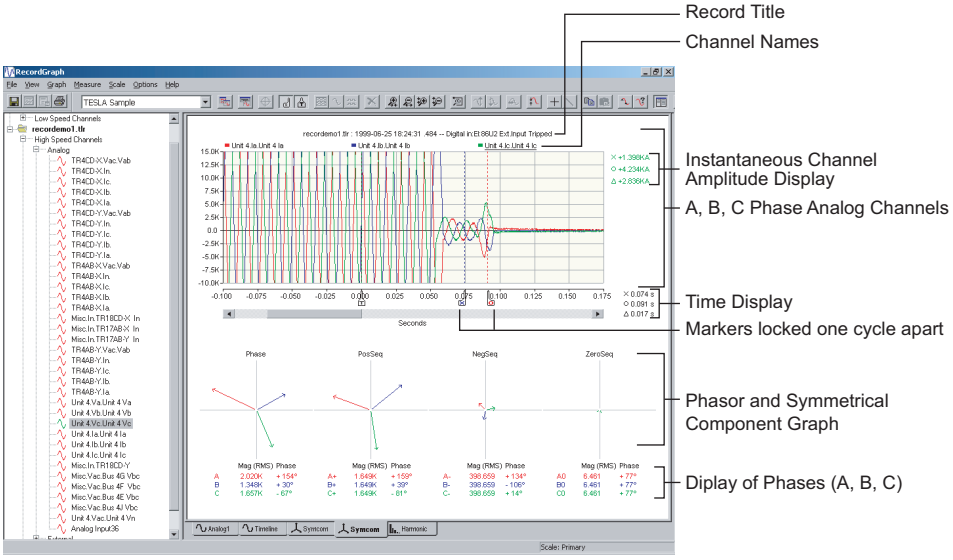

Record Title
Channel Names
Instantaneous Channel Amplitude Display
A, B, C Phase Analog Channels
Time Display
Markers locked one cycle apart
Phasor and Symmetrical Component Graph
Diplay of Phases (A, B, C)

Figure 2.76: Symcom View

- Symcom View is designed to analyse symmetrical components of voltage or current channels.
- You must load 3 voltage or current channels to view the components and associated phasor plots from the same record.
- The view displays: analog channels, positive, negative, zero sequence phasors and corresponding table which contains numerical values of these components and phase angle.
- All the components are calculated in RMS values.
- Channel instantaneous values are displayed on the RHS of the analog graph.
- Markers are permanently set on the graph one-cycle apart.
- Grab the marker and move (on the time line axis) to display new set of components and phasor values.
- Phase rotaton can be selected by right-clicking and selecting the *Set Phase Rotation* option. Select ABC or ACB.

Harmonic View

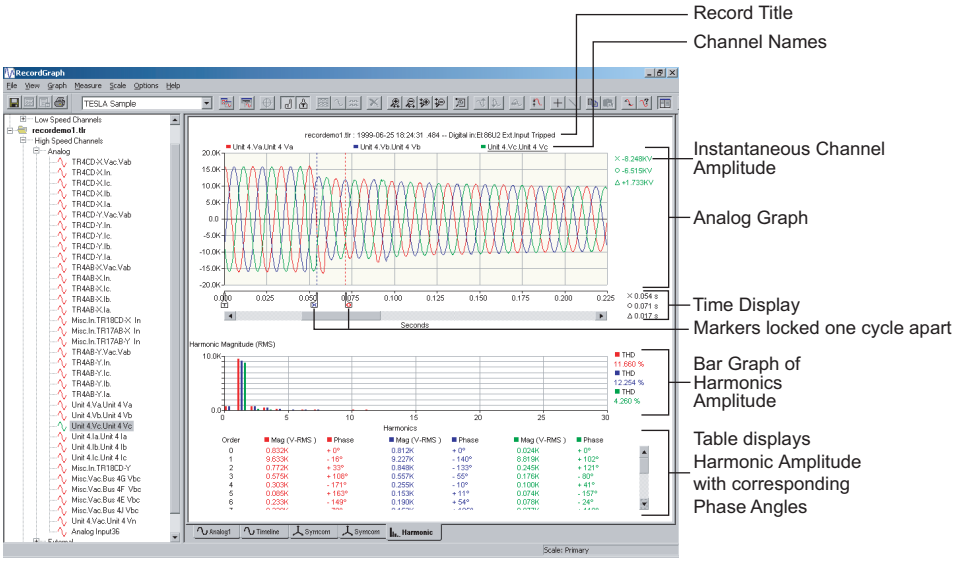


Figure 2.77: Harmonic View

- Harmonic View is designed to analyse harmonics associated with analog channels.
- A maximum of 3 traces can be analysed per view.
- The view displays: analog channels, a bar graph of harmonics and a table which contains RMS values of the harmonics with phase angle.
- A maximum of 25 harmonics (order) can be displayed.
- Channel instantaneous values are displayed on the RHS of the analog graph.
- Markers are permanently set on the graph one-cycle apart.
- Grab the marker and move (on the time line axis) to display a new set of harmonics.

All harmonic phase angles are compensated and referenced with respect to "A" phase voltage in relays and a configured channel in TESLA recorder. For COMTRADE records phase voltage is the first analog channel considered as the reference phase.

Impedance View

Impedance View is an R-X plot. The R-X quantities are calculated over the entire data range from the recorded analog voltage and current channels. R-X plot is useful in analyzing the performance of L-PRO relays and swing disturbances from the TESLA recorders. Since the information to be displayed involves time as a third dimension, this view provides meticulous cursor and zoom control over the data points being viewed. Optionally it supports superimposition of the relay characteristics (Zone 1, Zone 2, Line, Blinders, etc.) from L-PRO records or files generated from any L-PRO *Offliner* settings program.

The following table summarizes the types of channels from which impedance (R and X values) is derived along with the supported product. RecordGraph displays these channels on the left hand side in the tree view. Depending on the product, the following basic quantities are used the respective impedance channels.

In impedance calculation, a threshold limit is used based on the fundamental RMS value of the current to include or exclude the R and X values for plotting. This limit depends on the CT module used for the relay or recorder application. For 1A CT module, 0.02 A is the limit whereas for a 5A CT module, 0.1 A is used as the limit. When the data is copied to the clipboard, the discarded values of R and X values are not exported.

Table 2.2: Impedance View

Sl. No.	Channel Types	Quantities	Supported Products
1	High Speed (HS)	Voltage and Current	B-PRO, L-PRO, TESLA, COMTRADE
2	High Speed (HS)	Positive Sequence Voltage and Current	TESLA
3	Low Speed (LS)	Voltage and Current	TESLA
4	Low Speed (LS)	Watts, Vars and Voltage (Phase and Sequence)	B-PRO, L-PRO, TESLA
5	Low Speed (LS)	Positive Sequence Voltage and Current	B-PRO, L-PRO, TESLA
6	Low Speed (LS)	Impedance (Phase and Sequence)	B-PRO, L-PRO, TESLA

To add an Impedance view select *View>Add..* or the Add a View tool bar button. From the dialog box select Impedance View.

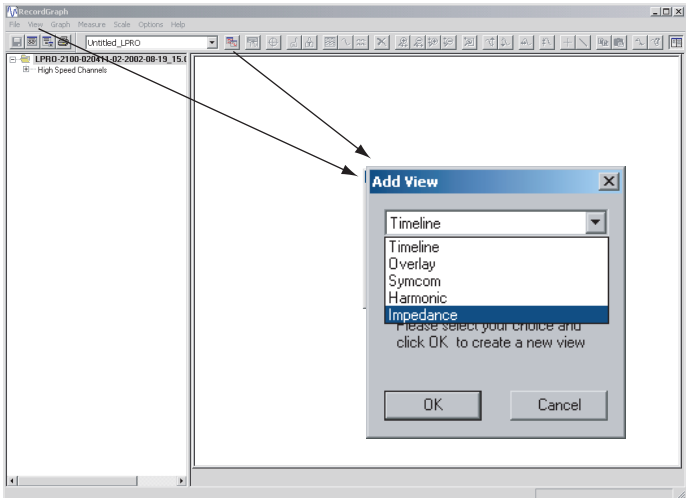


Figure 2.78: View>Add> Impedance

The Add View… dialog box lists the Impedance View only if the selected record is from B-PRO, L-PRO, TESLA or COMTRADE records depending on the record type.

When the Impedance View option is selected, following initial screen is displayed.

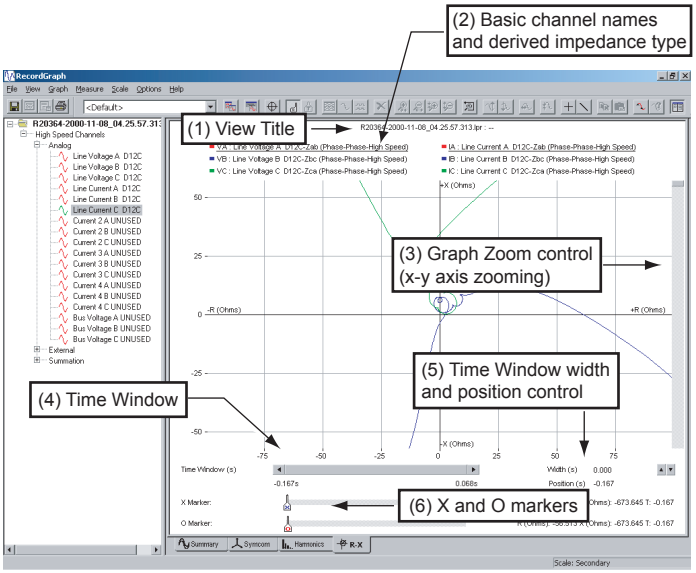

(2) Basic channel names and derived impedance type
(1) View Title
(3) Graph Zoom control (x-y axis zooming)
(5) Time Window width and position control
(4) Time Window
(6) X and O markers

Figure 2.79: Opening Impedance Screen

Components and Controls

1. A text component displays the title at the top of the Impedance View shown in Figure 2.79: Opening Impedance Screen. The title is compiled from items in the Title Options dialog box. Default title is the file name and trigger event.
2. The basic channel names are displayed below the title, refer to table “Channel Types” on page 2-41.
3. The graph zoom is controlled using the sliding control on the right side of the window. The R-X plot aspect ratio is maintained under all zooming tools. The graph zoom control offers a 10x zoom factor between minimum and maximum amplitude of the data (R and X coordinates).
4. The Time Window control provides a means to select the range of data for better presentation of R-X values. For example, if the voltage and current channels are recorded from 0.0 to 0.2 seconds with 1000 data points, using this control, you can choose to view only 0.1 second data (500 points).
5. Time window width and position control can be used for the precise data analysis.
6. Control the X and O markers.

Create Impedance View with an L-PRO Record

1. Launch RecordGraph with an L-PRO high speed (fault) record and expand the channels in the tree view.
2. Create an Impedance View using *View>Add...* or use the tool bar option.
3. Select line voltages A, B and C, and corresponding line currents A, B and C from the tree view. Impedance (R and X) corresponding to Zab, Zbc and Zca phase-phase are calculated internally and displayed.

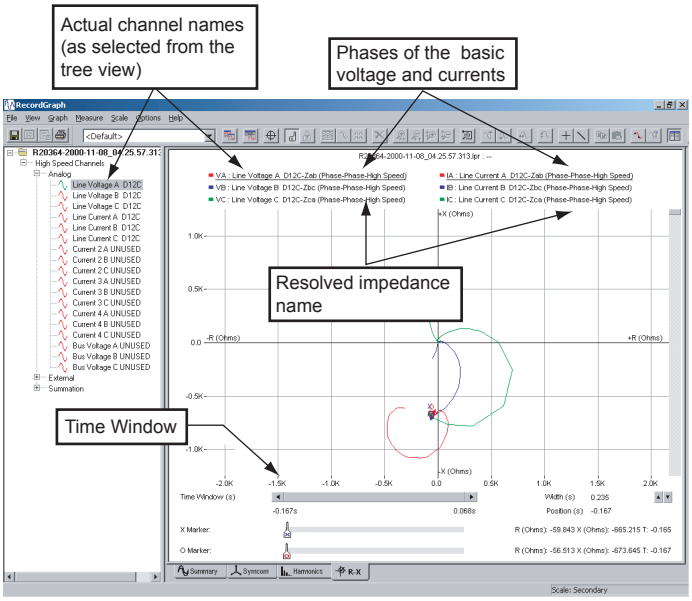

Actual channel names (as selected from the tree view)
Phases of the basic voltage and currents
Resolved impedance name
Time Window

Figure 2.80: Create Impedance View with an L-PRO Record

Each channel name is divided into three parts:

- the basic quantity (voltage or current) used in the calculation of the impedance
- the name of the actual channel selected
- the resolved impedance name with the configuration (phase-phase or phase-ground)

The Time Window control shows the minimum and maximum time of the data viewed. In the above example, the full range data is viewed.

Use the graph zoom control to zoom the x and y axis.

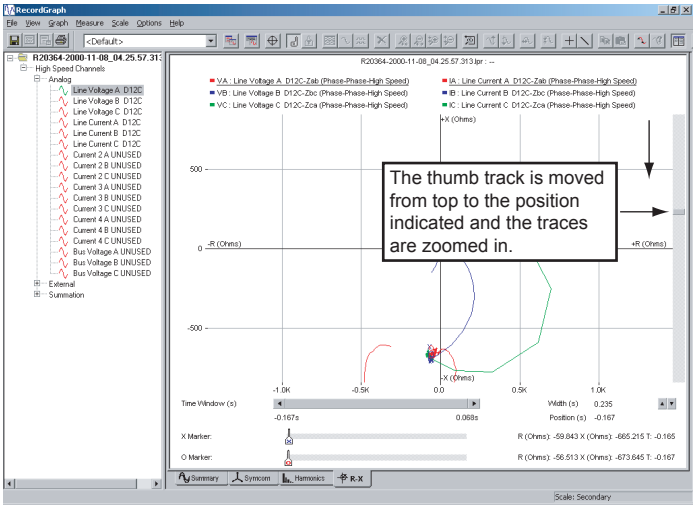


Figure 2.81: Example of graph zoom control

When you move the mouse near the edge of the Time Window control, the cursor shape changes from normal arrow to two headed arrow as shown in the diagram. Now you can resize the thumb track to a desired level of data range. In the example, the data starts at position -0.1667 and ends at (-0.1667 + 0.0109), where 0.0109 is the width (total data range). Therefore, only small portion of the data can be viewed.

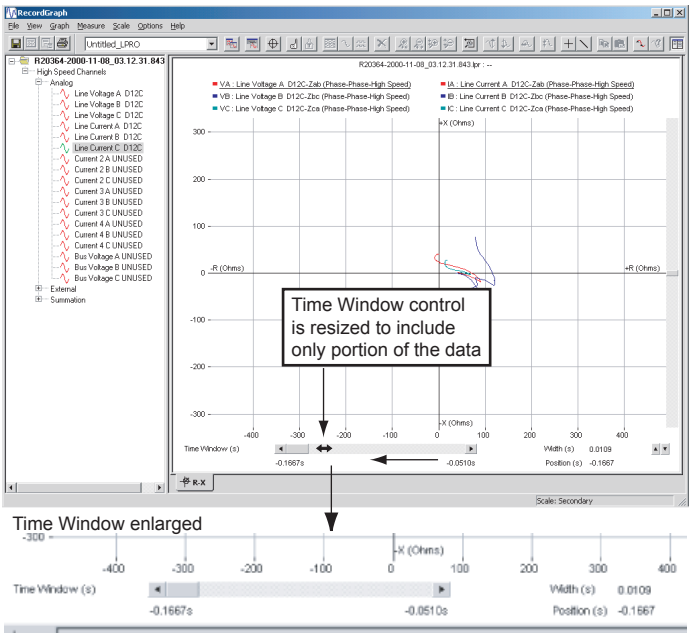


Figure 2.82: Example of using Time Window control

If you move the thumb track (not resize) to the extreme end, then the traces are rendered in the new data range.

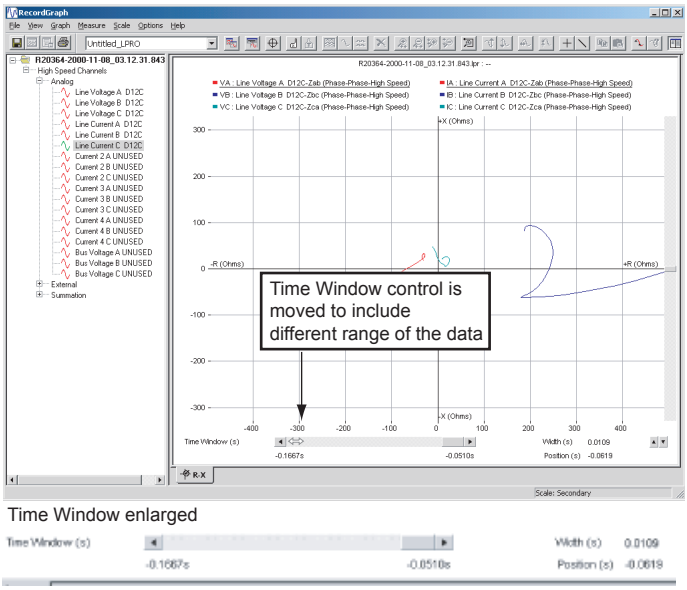


Figure 2.83: Time Window control moved to new location

In the above case, the data is included from range -0.0619 to -0.0619 + 0.0109, where 0.0109 is the data width. The 0.019 width remains same. If you resize the thumb track, then the width can be controlled; or you can double-click near the number 0.0109 to get a dialog box to enter the data range precisely.

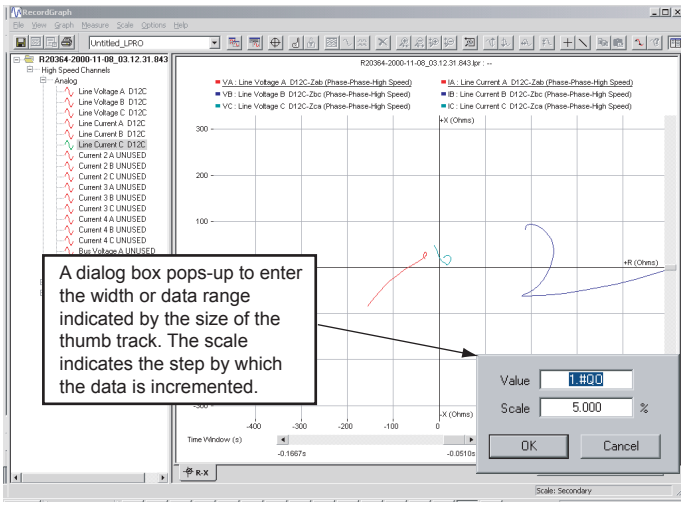

A dialog box pops-up to enter the width or data range indicated by the size of the thumb track. The scale indicates the step by which the data is incremented.
Value
1.#00
Scale
5.000
%
OK
Cancel

Figure 2.84: Indicate data range

A dialog box appears to enter the width or data range, which is indicated by the size of the thumb track. The scale indicates the step by which the data is incremental. For example, when the spin control arrow is clicked (after closing the dialog box), if an up arrow is clicked, the data is incremental from present position to present position + 5%. On the other hand, if the down arrow is clicked, the data is detrimental by 5%.

Example to Superimpose the L-PRO Relay Characteristics

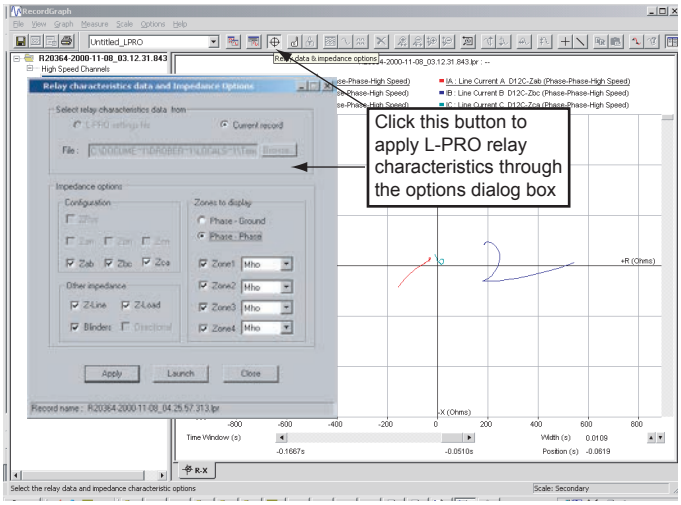

Click this button to apply L-PRO relay characteristics through the options dialog box
Relay characteristics data and Impedance Options
Apply
Launch
Close

Figure 2.85: Superimpose the L-PRO Relay Characteristics

When you select the *Relay data & impedance options* button, a dialog box appears. The parameter required, such as k0 factor, the line sequence impedance values, the system voltage data and the other required information is initialized through this dialog box initialization. All these values are read from the settings file associated with the record.

Table 2.3: Relay data and impedance options	
L-PRO settings file	Radio button to select relay characteristics from the current record. If an L-PRO record is selected, this button is enabled.
Current record	If a B-PRO, TESLA or COMTRADE record is selected, this button is enabled.
File	Displays the settings file (full path name) from which the relay data is extracted to plot the impedance characteristics.
Browse	Gives an option to select the settings file from any other location. The file type filter reads or selects only *.lps file type, if L-PRO setting file is selected..
Impedance Options	Impedance configuration option includes a number of other options, such as, Phase-Phase, Phase-Neutral, radio button. Depending on this option and the type of channel, different impedance options (check buttons) are enabled.
Configuration	Zpos (positive sequence impedance 3 phase basis)
	Zan, Zbn or Zcn
	Zab, Zbc, or Zca
Other Impedance	
Z-Line	Displays the line angle (can be checked or unchecked)
Z-Load	Displays the coordinate of the load impedance (can be checked or unchecked)
Blinders	Available only if the Phase-Phase option is chosen.
Directional	
Zones to display	Phase-Ground or Phase-Phase
Zone 1 to 4	Zone1-Zone4 displays the respective zones impedance characteristics (can be checked or unchecked)
Apply	Redraws the display with the currently selected options.
Launch	Launches the setting file through the *Offliner* settings program. Note that the L-PRO *Offliner* setting program should be installed for this to work successfully.
Close	Closes the dialog box.

In the *Relay data and impedance options* dialog box check the Zone 1 to Zone 4 boxes and select the *Apply* button. All the four zone characteristics are superimposed on the calculated phase impedances (note that the characteristics are zoomed using free-form zoom to get a better resolution).

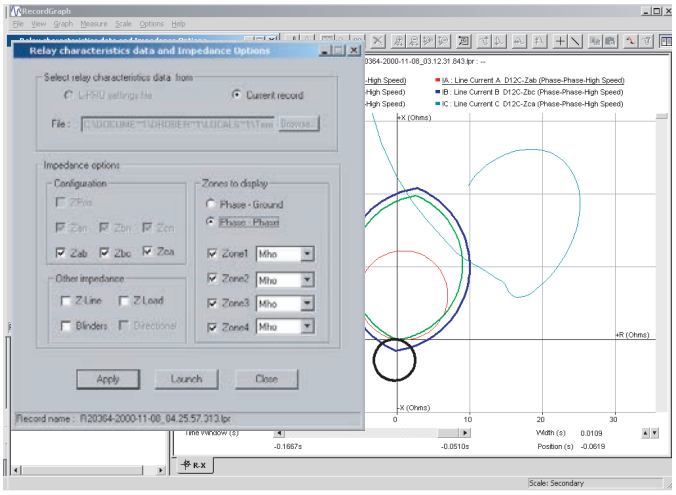


Figure 2.86: Example superimposing the zone characteristics

In the above example phase-phase impedances Zab, Zbc and Zca are selected, indicated by a check mark, but only Zca is in the zoom range.

All the four zones mho characteristics are superimposed. You can see that the Zca impedance has entered the Zone 2 and Zone 3. You can use a combination of zoom and time window control to analyze the precise time at which the impedance enters the zones.

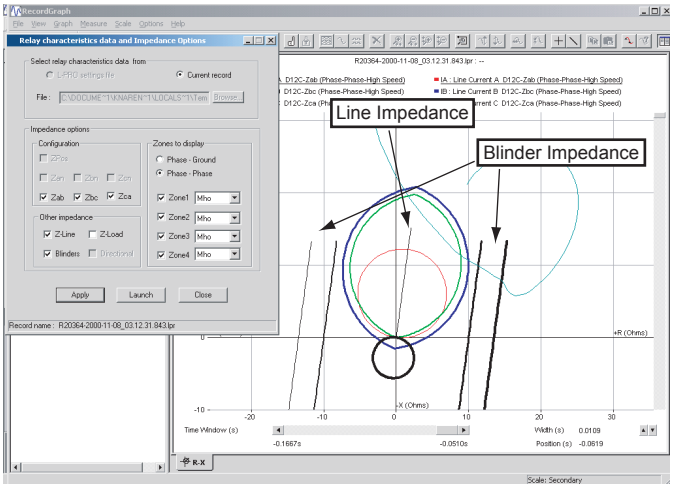


Figure 2.87: Example showing the Line and Blinder impedances

Check the Z-Line and Blinder boxes; then select the *Apply* button to superimpose the line and blinder impedances.

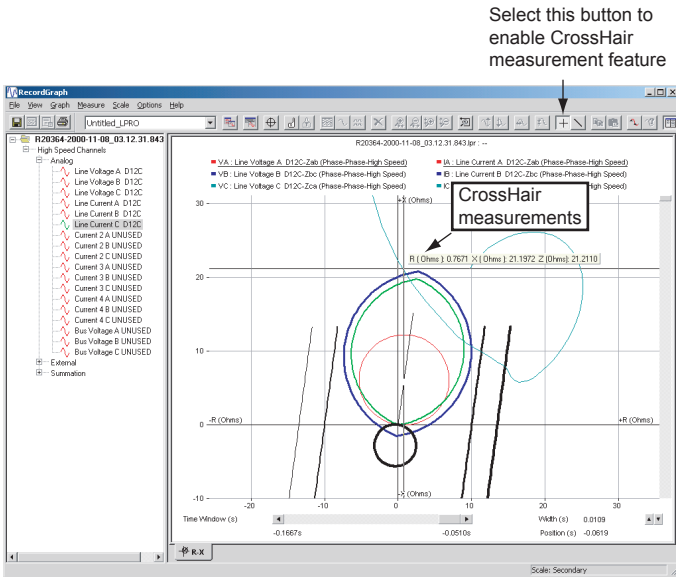


Figure 2.88: Example illustrating the use of the CrossHair measurement

Select the *CrossHair* button. When you drag the mouse (left button down and move) on any point on the trace, the R, X and the Z corresponding values are displayed.

You can move the cursor anywhere on the graph to get the measurement. When this feature is enabled, free form zooming is disabled; but you can use the graph zoom control to get a closer look at the trace.

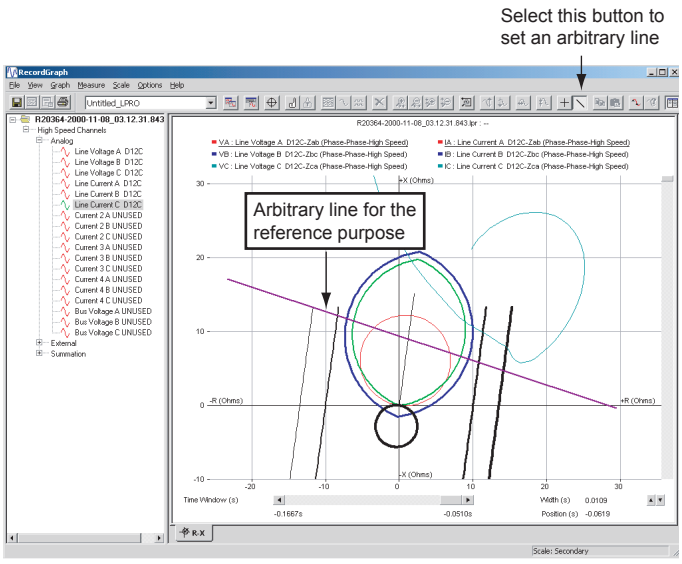


Figure 2.89: Example of the Line feature

Set a reference line to measure the data using the *Line* feature. This line is a reference line and not associated with the data values.

When the line option is enabled, the free form box zooming is disabled. Disable the CrossHair measurement to resize and move the reference line; then enable the CrossHair option to measure the values.

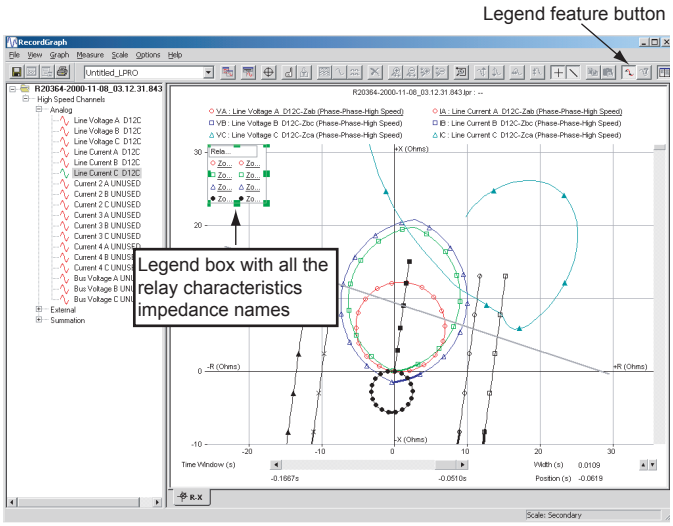


Figure 2.90: Example of the legends feature

Use the legend feature to distinguish relay characteristics from the calculated impedances. You can move the legend box and resize to the desired level. You can hide the legend box by re-selecting the legend option again.

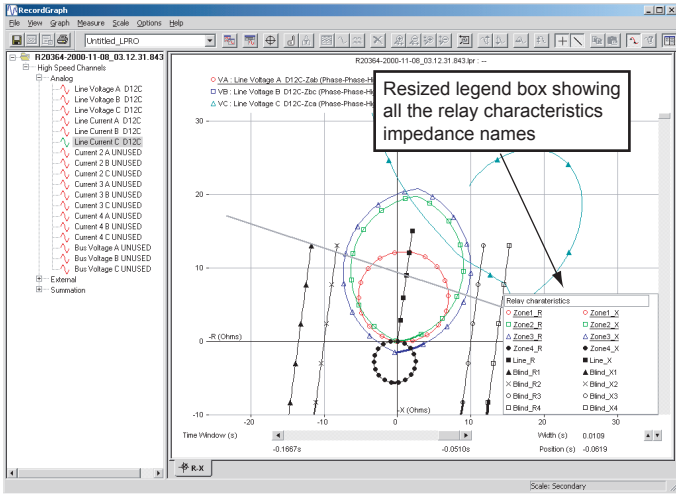


Figure 2.91: Legends features moved and enlarged

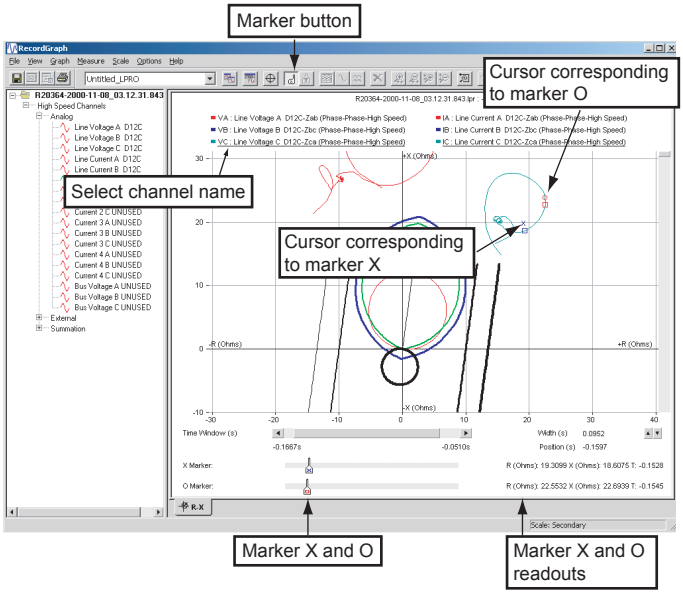

Marker button
Cursor corresponding to marker O
Select channel name
Cursor corresponding to marker X
Marker X and O
Marker X and O readouts

Figure 2.92: Example illustrating the use of data markers

Select the marker option to set the markers. Select the desired channel name for the required measurement. For example, the channel associated with Zca is chosen (click this channel name for the selection). Move the marker by sliding it to the desired location. When you change the data range (using Time Window control), the cursors may disappear from the traces indicating that the markers are always associated with the data.

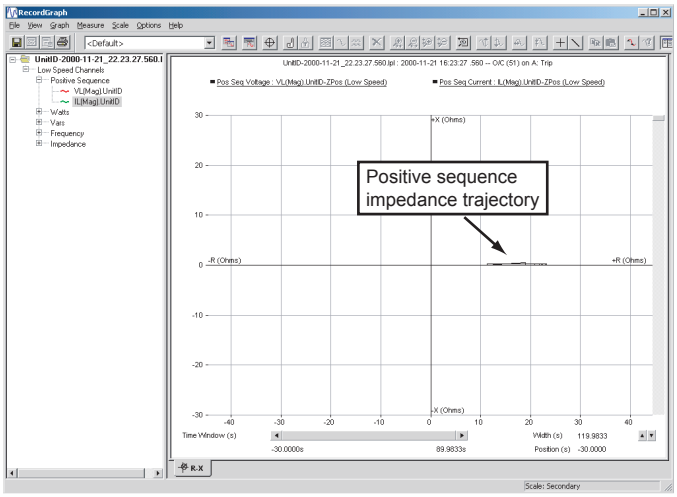


Figure 2.93: Example of L-PRO swing record choosing positive sequence voltage and current

Select an L-PRO swing record from RecordBase View and expand the channels. Click the positive sequence voltage and current; RecordGraph automatically calculates and displays the positive sequence impedance.

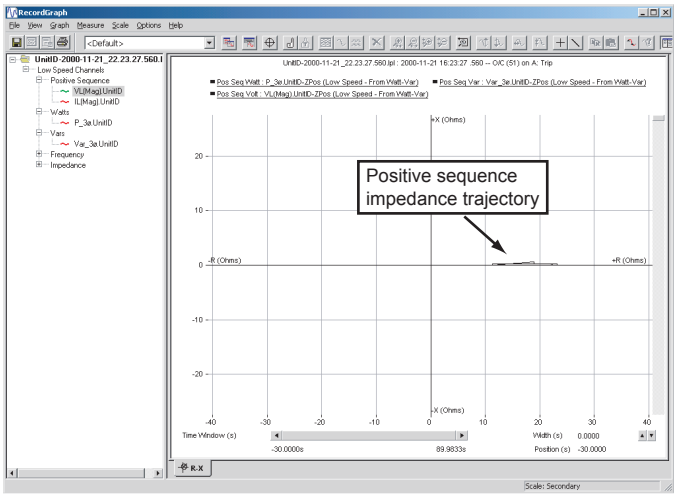


Figure 2.94: Example of L-PRO swing record choosing watt, var and positive sequence voltage channels

Select an L-PRO swing record from RecordBase View and expand the channels as shown. Click the watt, var and positive sequence voltage; RecordGraph automatically evaluates and displays the positive sequence impedance.

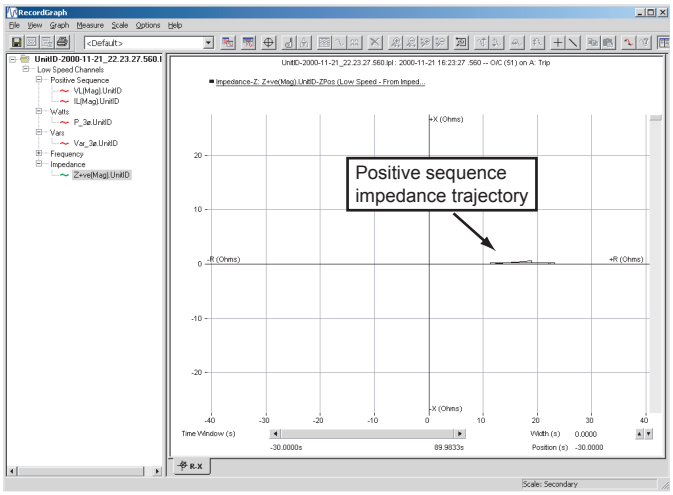


Figure 2.95: Example of L-PRO swing record choosing impedance channel

Select an L-PRO swing record from RecordBase View and expand the channels as shown. Click the impedance channel; RecordGraph automatically displays the positive sequence impedance trajectory.

As you select the desired channels, the impedance (R-X characteristics) are superimposed on the existing relay characteristics. To select new set of voltage and current channels use the *Delete trace(s)* option from the right-click context menu and select new channels. If desired, you can modify or re-apply the impedance options.

Drag the thumb track on the scroll bar to zoom in or zoom out the axis range. In the Time Window control + click the arrow buttons or drag the thumb track to scroll the window of visible data in the time domain.

To place the X and O markers use the tool bar or the right-click context menu or the *View>Markers* option, dragging a marker to the right or left moves corresponding marker. If the Time Window control does not show the data, then the markers are shown as small triangles on the left or right sides. If you click the triangle, corresponding data cursor is displayed and the time range is automatically adjusted.

You can save all the impedance display options to a template file (*File> Save t*

Differential View

Differential View displays the variation in operating current, Io and restraint current Ir. This view is designed specifically for T-PRO and B-PRO (single and 3 phase) relays. This view is designed with intuitive zoom, time range and cursor controls similar to that of Impedance View.

> The *Add View* dialog box is only available if the selected record is from T-PRO or B-PRO.

Open a record from a T-PRO or a B-PRO relay; then use the *View>Add..* button and choose Differential View.

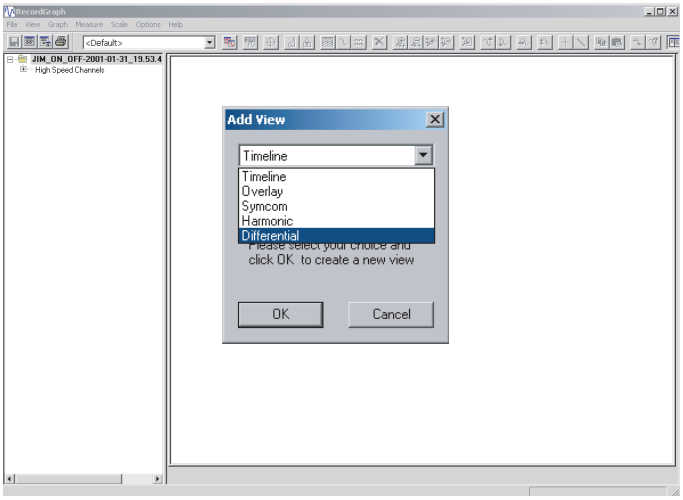


Figure 2.96: Add Differential View

When you select the Differential View option, the following screen is presented.

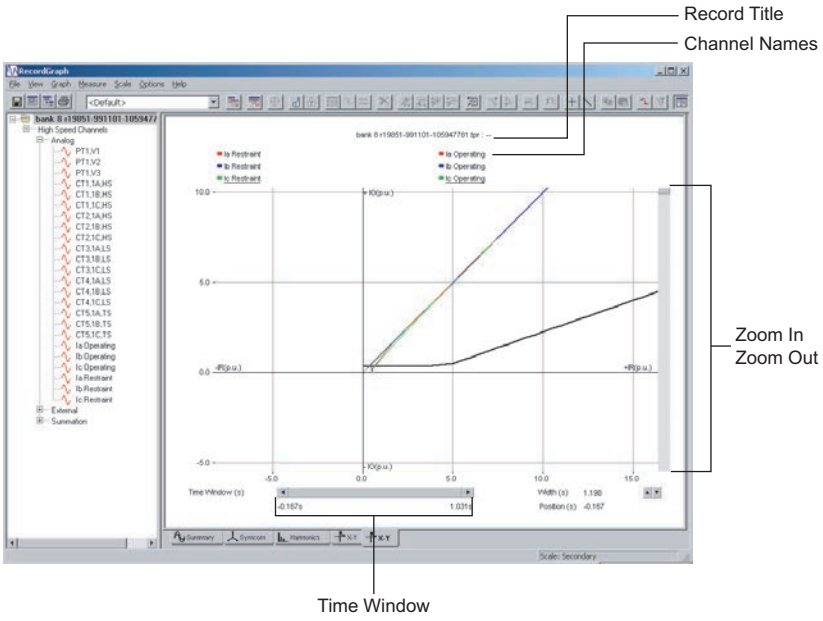


Figure 2.97: Differential View

In case of T-PRO and B-PRO 3-phase relays, the differential characteristics corresponding to a, b and c phases are displayed, whereas in the case of single phase B-PRO, the selected phase differential characteristics are displayed.

Note that in this view, you are not allowed to add/delete traces, but the zooming, panning, markers and other facilities which are available in the Impedance View is also available with this view.

The differential characteristics are only displayed for those devices which are enabled. If no devices are enabled, then a blank graph will be displayed.

Phasor View

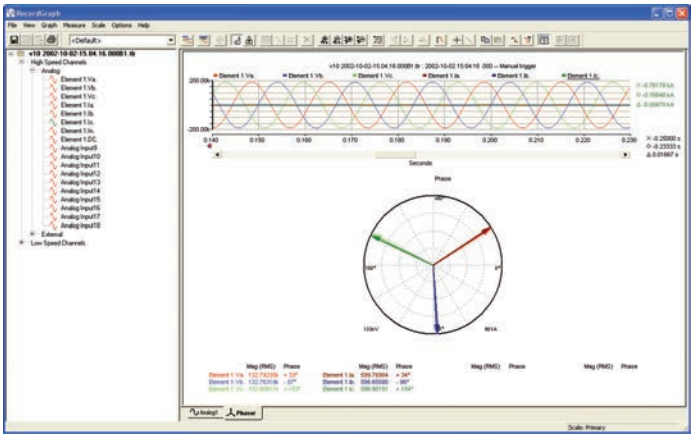


Figure 2.98: Phasor View

- Phasor View is designed to display a phasor diagram of selected elements within a data record using the RecordGraph application.
- It uses both rotational and time domain-graphs to demonstrate signal and phasor data.
- A maximum of 12 channels can be added to the phasor view.

Trend View

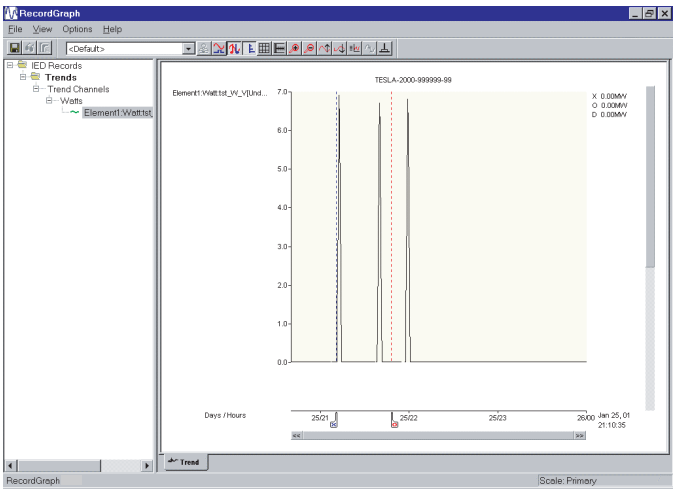


Figure 2.99: Trend View

- Trend View is designed to display “trend” data.
- It has a special x-axis, common to all the graphs to display the data in the “date” format. When zoomed, the scale automatically changes depending on the date range. (For example: years/months or months/days or days/hours or hours/minutes or minutes/seconds).
- Each analog graph in a trend view can display one trace.
- A maximum of 32 graphs can be added per view.

2.5 Templates

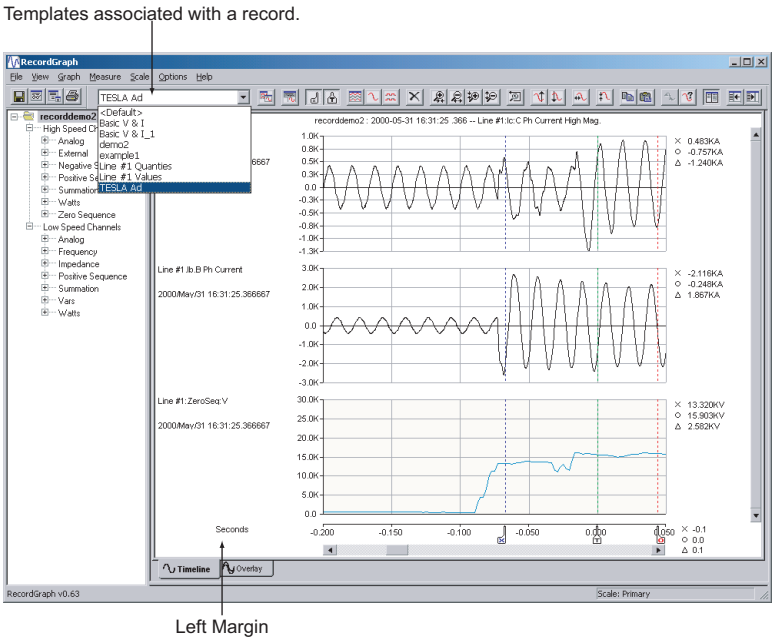


Figure 2.100: Template List

Template contains user-defined layout information including:

- Views – graphs and their location along with the traces (channels)
- Markers position (X, O and trigger marker, T)
- Views and graphs title options
- X axis scaling (zooming information)
- Y axis scaling (zooming information)
- X axis shift (time alignment) of each channel
- Measurement (readout) options
- Left Margin

Template stores the easy-to-manage layout information in a file based on product type (B-PRO, F-PRO, L-PRO, T-PRO, TESLA, COMTRADE).

When the template information is stored, it can be applied to any recording (normally from same IED or product) for which the template is valid. For example, if a template has 3 views with 3 graphs per view, and has 1, 2 and 3 analog channels displayed with various options, this information can be applied to any record with that common framework. The concept is to re-use the common layout information and update the data information with the new recorded channels thus reducing the graph re-creation processing time.

These flexible and user-defined templates can be shared among different users. Normally (under default installation options), templates are stored on the local

hard disk in a sub-folder where the RecordGraph application resides, for example, My Documents\ERLPhase\RecordGraph\Template.

The template graphical layout file contains information about fixed views, graphs, traces, marker positions, read-out, scaling and zoom range. You can analyse a system disturbance recorded at different times and at different locations using the template.

When a template is opened, the predefined layout information is automatically applied based on the new record (or set of records). You can save time by viewing the data recorded without manually loading the traces again. Templates are the first step in generating a visual report.

You automatically form a template when you create views and graphs. To reapply the template to a different recording from the same or different recorder, you must save this layout information in a file. You can extend or alter templates by manipulating views, graphs and traces.

Templates are not saved automatically, but must be saved using the *File>Save Template* option. Template files can be shared and customized. The list of templates is dynamically created and displayed in the tool bar. When a record is added to RecordGraph, an automatic scan search is done to list the templates corresponding to the record loaded. This list may have both single or multi-record templates, if the record loaded is a part of multi-recorder template. If no match is found, a <Default> template is loaded. You can define any number of templates based on a single recorder or multiple recorders.

Default Templates

Hard coded, static default templates are created whenever you open the RecordGraph application. These are not stored in the file, but are dynamically created and displayed as <Default> in the list box.

You can override this <Default> template by saving any other template as a default template.

The user-defined default template path is stored in the registry key based on the product and the type of recording (applicable for all products).

For example:

- TESLA/HS - high speed
- TESLA/LS - low speed
- TESLA/Trend - slow recordings

Managing Template Files

Whenever a new record file is loaded into the RecordGraph, it automatically loads the relevant template file names in a list box attached to the main tool bar. The template files are filled or updated based on certain rules:

- Templates are stored based on product type.
- If a user-defined default template is available, it is loaded as the first item in the list box, otherwise, a static <Default> template is listed as the first item.
- Template files are matched based on IED (serial number) in the case of TESLA recorders and are common in case of relay products (B-PRO, F-PRO, L-PRO, T-PRO.

If template files for a TESLA recorder are created and stored (for example, with serial number TESLA-2000-981103-07), these template files can not be applied to another recorder with different serial number such as TESLA-2000-981103-08. On the other hand, if template files are created for relay products such as L-PRO, this template can be applied to any relay IED B-PRO, F-PRO, L-PRO or T-PRO). Hence, templates are IED-based (serial number-based) in case of recorders and product-based in case of relays.

Double-click (or use the Enter key) on the currently active record in the RecordGraph tree list (displayed in bold) to apply the template or pick any desired template from the template list box.

Templates can be renamed, duplicated or deleted using template manager from within the RecordGraph.

There is no limitation on the number of template files used (as long as the hard disk space is available).

Create New Template File

1. Modify the existing template layout information and save the modified template into a new file.
2. Create new views and graphs by deleting the views from the existing layout and saving new ones into a new the template file.

If the template file is created from multiple records, all the records should be pre-loaded into RecordGraph to successfully apply the layout information.

Layout information is applied one at a time. If the template involves more than one record, apply template (double-click on each record) to fill respective channels. The name of the recorder IED in the template file are displayed in the tool-tip list box window when the mouse cursor is moved over it. The tool-tip also displays the product name and the user-defined default template file name, if one exists.

Templates Menus

Save Template

Displays a dialogue box only if <Default> template is currently displayed in the template list box. Since <Default> template name is reserved for hard coded templates, you must save the template information with a new name. If any other template file name is displayed, other than <Default>, the layout information is updated without the dialogue box being displayed.

Save Template As...

Displays a dialogue box to save the template. The option *Save as default template,* if checked, saves the template as user-defined default template. Refer previous section for more explanation on the user defined default template.

Template Manager...

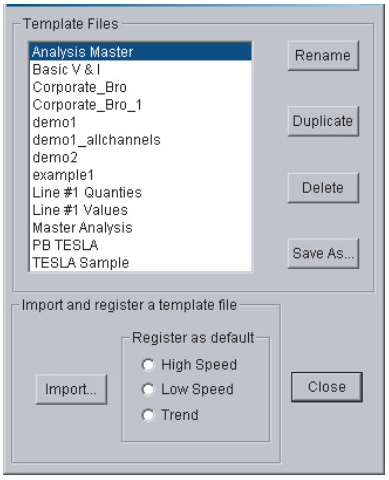


Figure 2.101: Template Manager

Brings up the template manager dialogue box which lists all the templates currently available.

Rename

Renames the currently selected template.

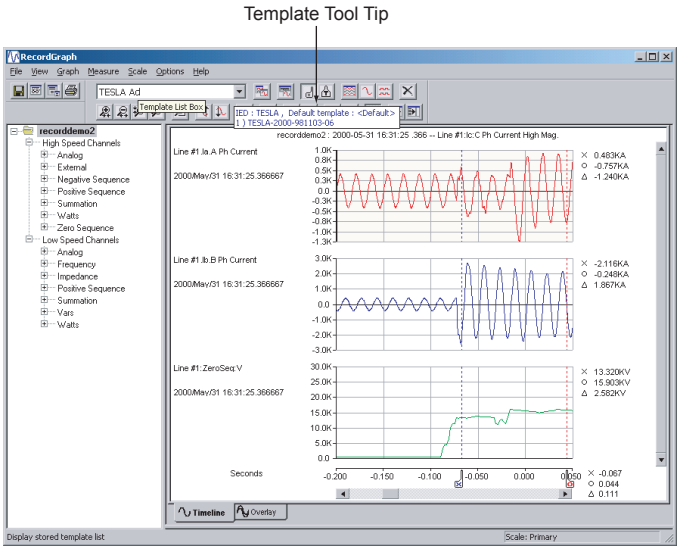
Duplicate

Copies the contents of the selected template into another file.

Delete

Deletes currently selected template.

Template - Tool Tip



Template tool tip information displays:

- IED name
- User-defined default template associated with that IED
- Serial number of the IED which is used as the unique feature to match the templates.

Template - Single IED

1. Open a record from the desired IED (B-PRO, F-PRO, L-PRO, T-PRO or TESLA).
2. Create or modify the existing layout information.
3. Use Save Template as... option to save the new layout information with a desired template name.

A single IED template is saved/matched based on its serial number. Any record from the IED with the same serial number can use or share the template (layout) information.

Template - Multiple IED

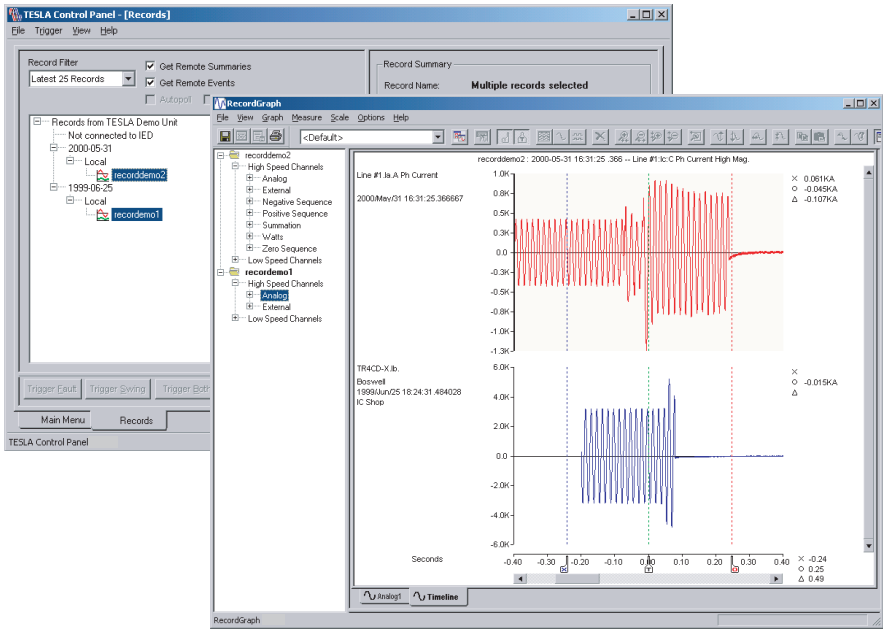


Figure 2.102: Multiple IEDs

1. Open records from two or more desired IEDs (different TESLAs or different relays).
2. Create or modify the existing layout information (create graphs by selecting channels from different IEDs).
3. Use Save Template as... option to save the new layout information with a desired template name.

When all IED records are pre-loaded into the RecordGraph, multiple IED templates are saved/matched based on serial number. If the record is loaded one at a time, then double-clicking on each record reapplys the template filling the respective channels.

2.6 View and Graph Titles

When a new record is loaded, the information corresponding to the options selected is compiled and the updated information is displayed in the View Title.

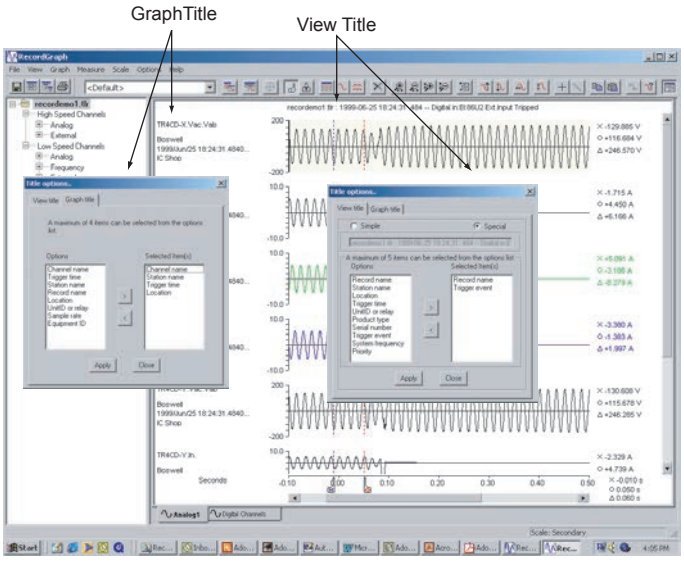


Figure 2.103: View and Graph Titles

View Title

View Title is the title on the top of each record view. When a new record is loaded, the information corresponding to the options selected is compiled and the updated information is displayed in the View Title. You can choose any of four options by clicking the arrows to move the items in the list. The option is saved into the template. This option is not available for the Symcom or Harmonic Views.

The option choices are:

- Record Name
- Station Name
- Location
- Trigger Time
- UnitID or Relay
- Product Type
- Serial Number
- Trigger Event
- System Frequency
- Priority

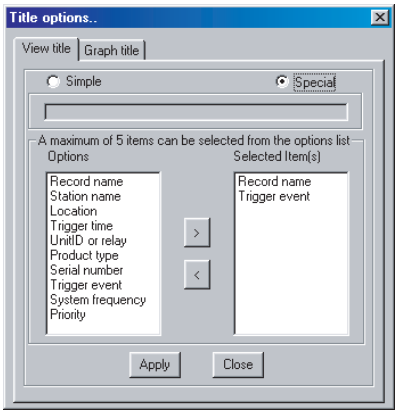


Figure 2.104: View Title Options

Graph Title

Graph Title is the information that appears on the left margin of each graph. Graph Title is a combination of various options. When a new record is loaded, the information corresponding to the options selected is compiled and the updated information is displayed in the Graph Title dialogue box. You can choose any four options by clicking the arrows to move the items in the list. The option is saved into the template. This option is not available for the Overlay View.

The option choices are:

- Channel name
- Trigger time
- Station name
- Record name
- Location
- UnitID or relay
- Sample rate
- Equipment ID

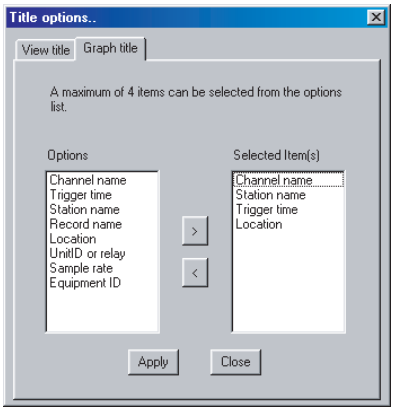


Figure 2.105: Graph Title Options

2.7 Readouts and Measurements

The Measure menu consists of the following:

- Markers
- Primary/Secondary
- Time Alignment
- Absolute Time
- Fundamental RMS
- True RMS
- Harmonics
- Symmetrical Components

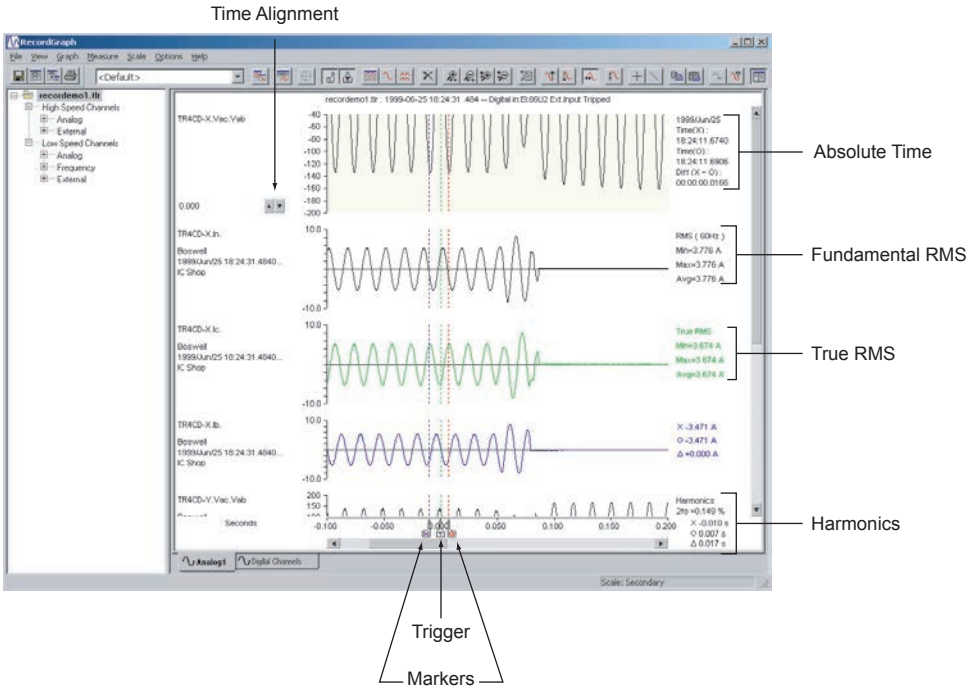


Figure 2.106: Readouts and Measurements

Markers

Selecting *Measure>Markers* or using the tool bar button places the “X” and “O” markers on the graph, as well as, automatically placing markers on all new graphs. If the markers are out of view range, double-click on the timeline graph to bring back the markers to the desired location. Marker positions are saved into the template. Readout corresponding to the option chosen is displayed on the right side of the graph. Selecting trigger marker, T, displays the trigger time of the record.

Primary

Selecting *Measure>Primary* multiplies the channel data by the primary scaling factor and redraws the y-axis for all graphs.

Secondary

Selecting *Measure>Secondary* multiplies the channel data by the secondary scaling factor and redraws the y-axis of all graphs.

Time Alignment

Use this option to offset or align the trigger time of channels (normally from different locations) or shift the x-axis time. This feature offsets the x-axis time data by a precise value as desired.

1. A trace (channel) must first exist on the graph. Click the graph that you want to show time alignment.
2. Select the *Graph>Time Alignment* menu option or the *Time Alignment* button on the tool bar.
3. Use the "spin" control (up and down arrows) to increase or decrease the offset.
4. Double-click the value to bring up a dialogue box to enter the new offset value and offset scale. Offset scale is the percent by which the increment is required.
5. Clear this option, by a second click on the *Time Alignment* button on the tool bar or by selecting the *Graph>Time Alignment* menu option a second time.

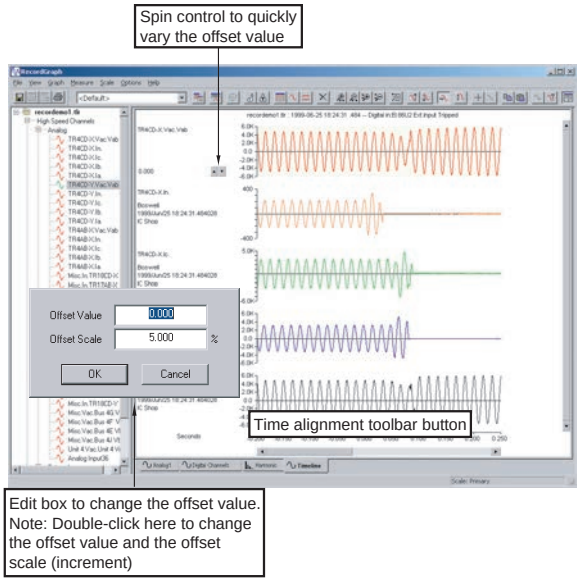

Spin control to quickly vary the offset value
Offset Value
0.000
Offset Scale
5.000
%
OK
Cancel
Time alignment toolbar button
Edit box to change the offset value. Note: Double-click here to change the offset value and the offset scale (increment)

Figure 2.107: Time Alignment

Absolute Time

This option displays the absolute time—the actual time of the recorded channels.

1. A trace (channel) must first exist on the graph. Click the graph that you want to show absolute time measurement.
2. Select the *Measure>Markers* menu option or the *Markers* button on the tool bar to place the markers on the graph. Markers are automatically placed if not selected.
3. Select *Measure>Absolute Time* menu option.
4. Readout corresponding to the markers is displayed on the right-hand side of the graph including:
   - Year, Month, Day of the recording (yyyy/mm/dd)
   - Absolute Time corresponding to marker X
   - Absolute Time corresponding to markers O
   - Difference in the Absolute Time between marker X and marker O

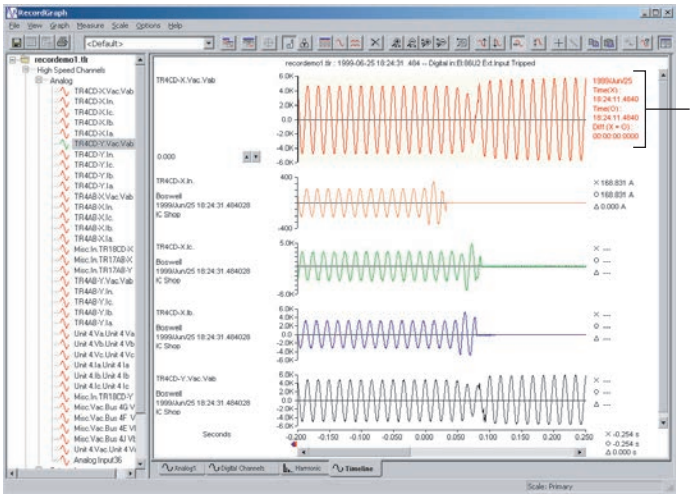


Figure 2.108: Absolute Time

Fundamental RMS

This option displays the RMS measurement of the fundamental (60 or 50 Hz) between the two markers (X and O) of the selected channel.

1. A trace (channel) must first exist on the graph. Click the graph that you want to show absolute time measurement.
2. Select the *Measure>Markers* menu option or the *Markers* button on the tool bar to place the markers on the graph. Markers are automatically placed if not selected.
3. Select *Measure>Fundamental RMS* menu option.
4. Readout corresponding to the markers is displayed on the right-hand side of the graph including:
   - RMS (fundamental frequency) Title
   - Minimum RMS
   - Maximum RMS
   - Average RMS

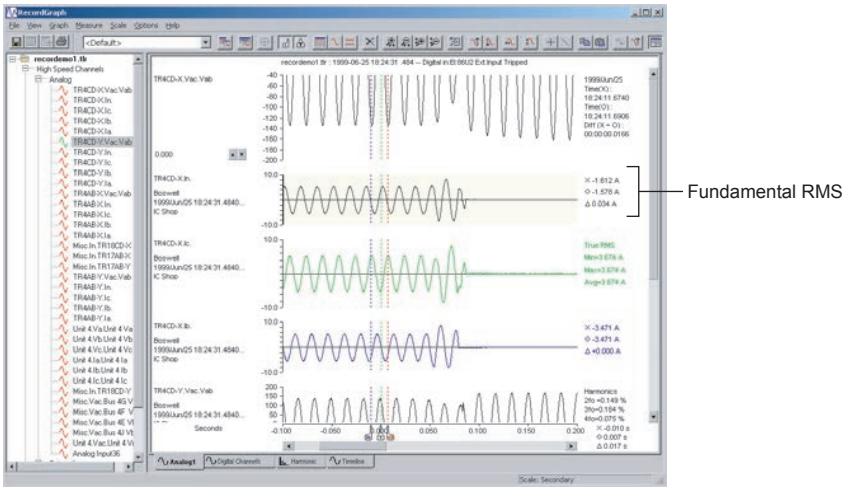


Figure 2.109: Fundamental RMS

True RMS

This option displays true RMS measurement values of all the harmonics (up to 25 order—including the fundamental), depending on the sample rate of the recorded channel.

1. A trace (channel) must first exist on the graph. Click the graph that you want to show absolute time measurement.
2. Select the *Measure>Markers* menu option or the *Markers* button on the tool bar to place the markers on the graph. Markers are automatically placed if not selected.
3. Select *Measure>True RMS* menu option.

Readout corresponding to the markers is displayed on the right-hand side of the graph including:

- True RMS Title
- Minimum True RMS
- Maximum True RMS
- Average True RMS

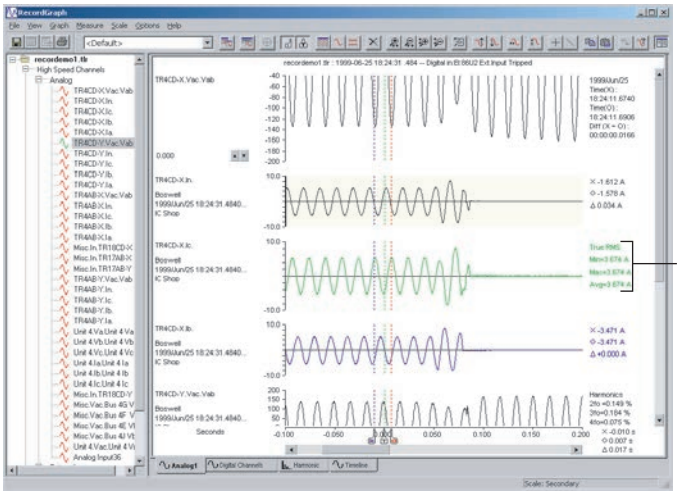


Figure 2.110: True RMS

Harmonics

This option displays the harmonic contents (magnitude) of the desired channel along with the Total Harmonic Distortion (THD) in percentage.

1. A trace (channel) must first exist on the graph. Click the graph that you want to show absolute time measurement.
2. Select the *Measure>Markers* menu option or the *Markers* button on the tool bar to place the markers on the graph. Markers are automatically placed if not selected.
3. Select *Measure>Harmonics* menu option.
4. Readout corresponding to the markers is displayed on the right-hand side of the graph including:
   - Harmonics Title
   - 2nd Harmonic
   - 3rd Harmonic
   - 4th Harmonic
   - 5th Harmonic
   - THD% of fundamental (up to 25 harmonics) depending on the sample rate.

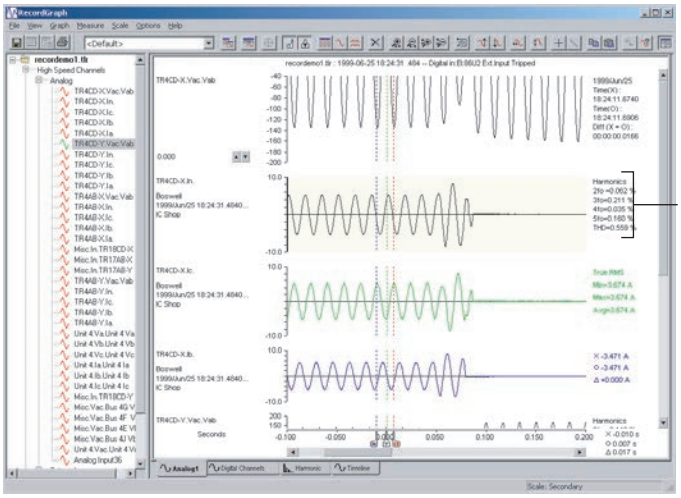


Figure 2.111: Harmonics

Symmetrical Components

This measurement option displays the magnitudes of the positive, negative and zero sequence components of 3-phase voltage or current channel.

1. Create an Overlay View— you must have a 3-phase voltage or current channel.
2. Place three phase voltage or current channels on the graph.
3. Select the *Measure>Markers* menu option or the *Markers* button on the tool bar to place the markers on the graph. Markers are automatically placed if not selected.
4. Readout corresponding to the markers is displayed on the right-hand side of the graph including:
   - SymCom Title
   - Positive sequence component magnitude
   - Negative sequence magnitude
   - Zero sequence magnitude

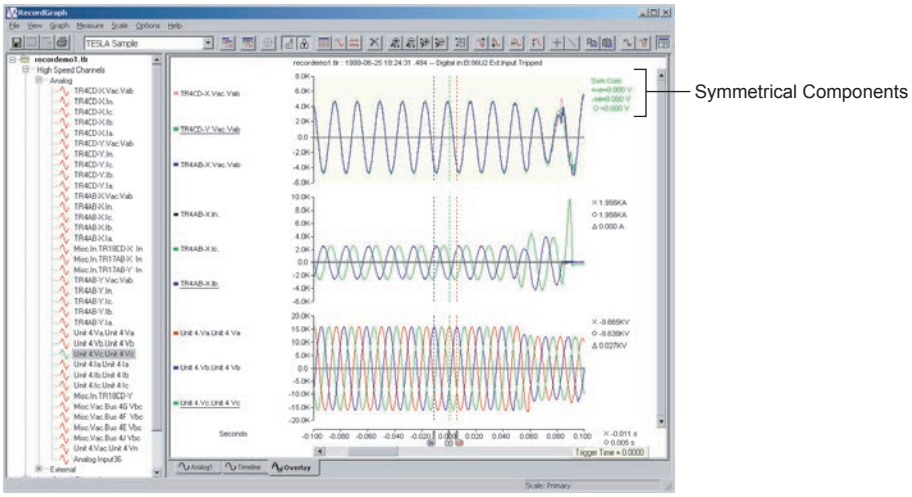


Figure 2.112: Symmetrical Components

Phase Rotation is automatically determined based on relay setting information, or is by default set to ABC; this can be changed by right-clicking on the view and selecting "Set Phase Rotation", or from the Options Menu.

2.8 Calculated Channels

Calculated channels are virtual channels derived from the original recorded channels. They are calculated based on the configuration information. In the TESLA recorder, all the calculated channels are added to the original record only once, but are available any time for the view with the RecordGraph application. Calculated channels differ widely depending on the product. They are classified under high and low speed categories.

High Speed Calculated channels

- Summation
- Positive sequence
- Negative sequence
- Zero sequence
- Watts (single and three phase)

Low Speed Calculated channels

- Summation
- Positive sequence
- Watts (single or three phase)
- Vars (single or three phase)
- Impedance
- External

Type and number of channels available for the view depends on the configuration information.

Choose *Options>Calculate Derived Channels Now* to add the calculated channels. If this option is disabled, then the calculated channels are already available.

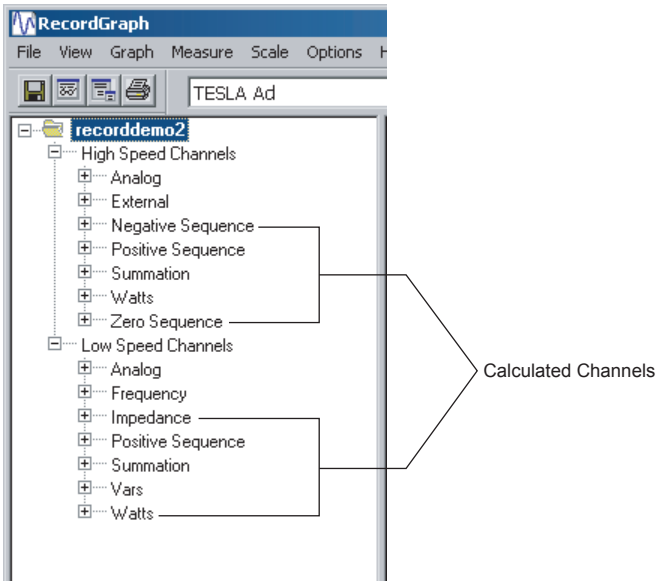


Figure 2.113: Calculated Channels

2.9 Exporting Views

Export active visible views to windows standard clipboard or to an enhanced metafile. Following options are available:

- Copy To ClipBoard
- Save As MetaFile

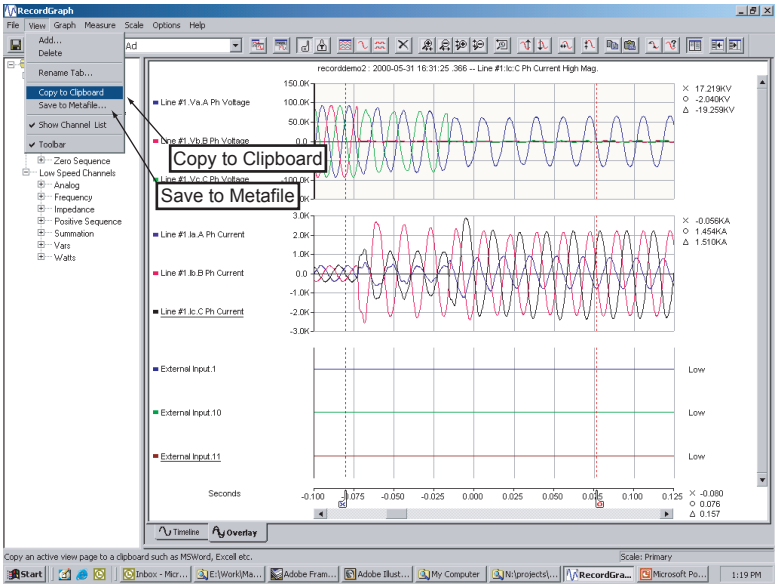


Figure 2.114: Export Views

Copy to Clipboard

Copies view to the clipboard in order to copy into another document, for example Microsoft Word.

1. To copy to clipboard select *View>Copy to Clipboard* or right-click on the graph to bring up the context menu and select *Copy to Clipboard*.
2. Open any other software package, which supports the “pasting” facility from the clipboard (for example Excel or Microsoft Word) and paste the view.

Save View as Metafile

Saves the view to a Metafile format *.emf.

1. To save to as a Metafile select *View>Save to Metafile...* or right-click on the graph to bring up the context menu and select *Save to Metafile.*
2. A dialogue box appears prompting you to save the file in a selected folder.

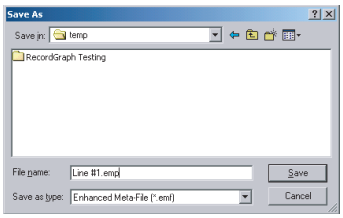


Figure 2.115: Save to Metafile

2.10 Exporting Channel Data

Any channel data can be exported to the clipboard from the active view. If a graph has multiple channels, all the channel data is exported to the clipboard.

This option copies the trace data to the clipboard and using *Edit>Paste* to paste into other applications like Microsoft Word or Excel.

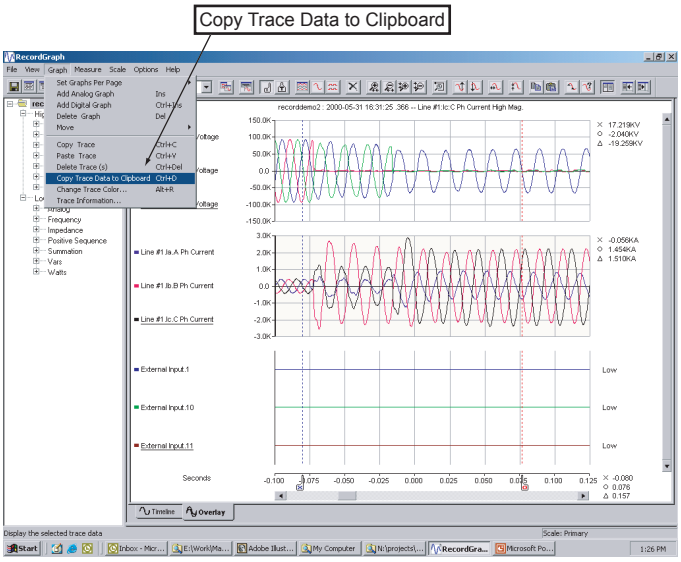


Figure 2.116: Copy Trace to Clipboard

Pasting exported data using Microsoft Excel

1. Open Microsoft Excel.
2. Choose *Edit>Paste Special.*

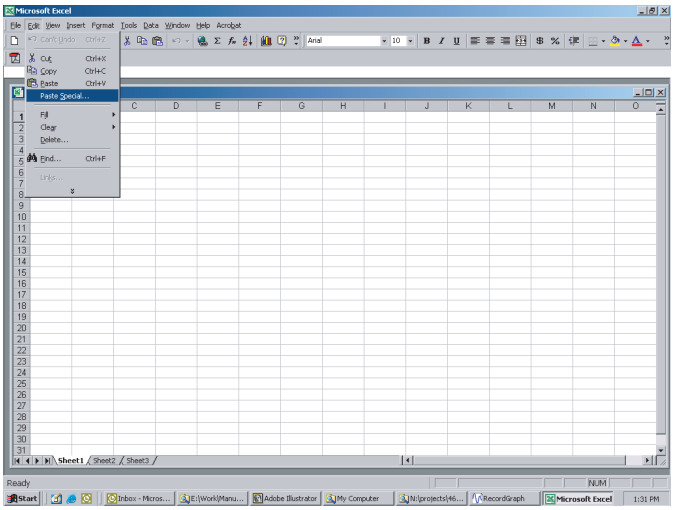


Figure 2.117: Paste Special using Excel

Pasting exported data using Microsoft Excel

Choose *csv* (comma separated variable) format and click *OK*.

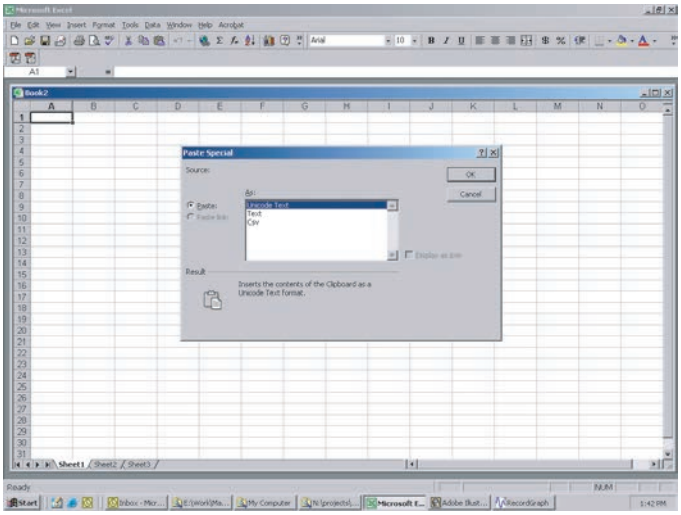


Figure 2.118: Choose csv

Pasting exported data using Microsoft Excel

Domain: normally time data, it can be date YYYY/mm/dd in case of trend data.

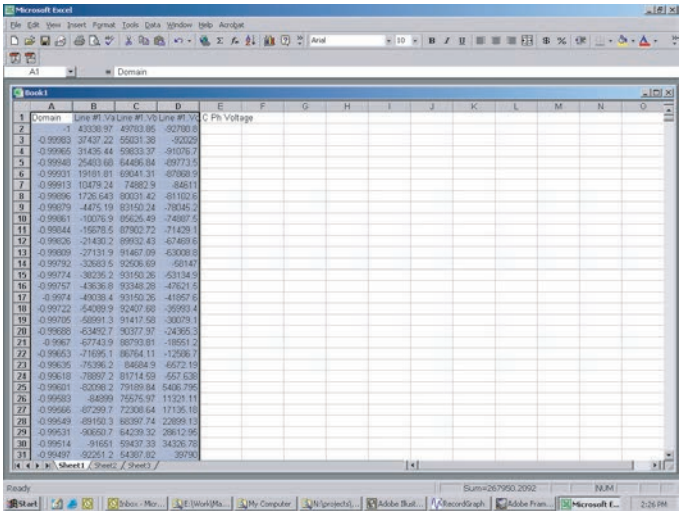


Figure 2.119: Past to Excel

2.11 Record Summary

1 Click the record name to enable this feature.

2. Choose *File>Show Record Summary…* to display the record summary.

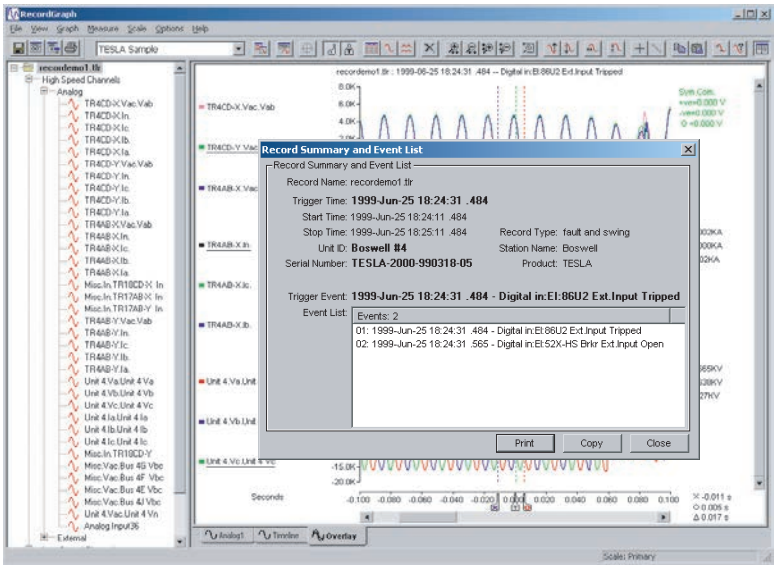

RecordGraph
File View Graph Measure Scale Options Help
TESLA Sample
Record Summary and Event List
Record Summary and Event List
Record Name: recordemo1.tlr
Trigger Time: 1999-Jun-25 18:24:31 .484
Start Time: 1999-Jun-25 18:24:11 .484
Stop Time: 1999-Jun-25 18:25:11 .484
Record Type: fault and swing
Unit ID: Boswell B4
Station Name: Boswell
Serial Number: TESLA-2000-990318-05
Product: TESLA
Trigger Event: 1999-Jun-25 18:24:31 .484 - Digital in:EI:86U2 Ext.Input Tripped
Event List:
Events: 2
01: 1999-Jun-25 18:24:31 .484 - Digital in:EI:86U2 Ext.Input Tripped
02: 1999-Jun-25 18:24:31 .565 - Digital in:EI:52X-HS Brkr Ext.Input Open
Print
Copy
Close
Seconds

Figure 2.120: Show Record Summary

2.12 Digital Channel Status Indicator

Highlight digital channel which change state (with different icons), and list only configured channels in the tree view. A mimic screen shot of the icons is shown below. The <default> template automatically displays the digital channels which changes the state.

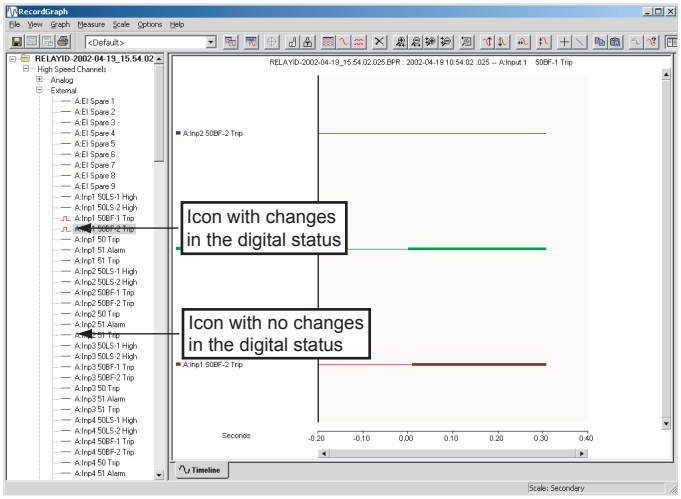


Figure 2.121: Digital Channel Status Indicator

2.13 Time Sync Input Status

Time Sync input status (synchronized, unsynchronized or not available) is displayed in the tool tip window when you place the mouse on the channel name or use Active Trace Information.

Additional information related to the time source (IRIG-B, SNTP, etc.) will also be available as a portion of the Time Sync status.

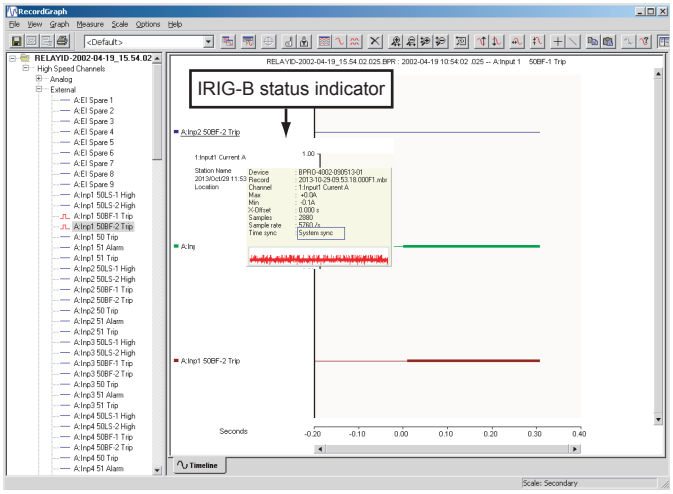


Figure 2.122: Time Sync Input Status Indicator

2.14 Derived External and Virtual Input Channels for TESLA Swing Recordings

TESLA recordings do not record External Input and Virtual Input channels for the swing records. A facility to view these channels in the RecordGraph is provided. RecordGraph automatically displays these channels (if configured) under low speed channel group. Events with the same element are grouped together to form a channel. This facility is backward compatible.

2.15 Derived Channels for L-PRO, F-PRO High Speed Recordings

For L-PRO and F-PRO high-speed records, Main and Aux individual phase summation channels are added to the existing derived summation channels. This facility is backward compatible.

2.16 Derived Channels for B-PRO, L-PRO Swing Recordings

For B-PRO and L-PRO swing records, real power, reactive power, and impedance channels for the configured inputs are added.

2.17 COMTRADE Import

COMTRADE (Common Format for Transient Data Exchange) is an industry standard record format used to share data between tools and to replay faults through a test set. The import utility supports viewing of both ASCII and binary COMTRADE formats (1991 and 1999). When the COMTRADE file is imported into the RecordGraph, all its functionality can be seamlessly used to analyze the record.

1. RecordGraph application must be running to access this facility. If not, launch RecordGraph via TESLA Control Panel, RecordBase View or Windows Explorer.
2. Choose *File>Import*.
3. Browse to select desired file.
4. Double-click on the COMTRADE record to apply <Default> template or select it from the templates list box.

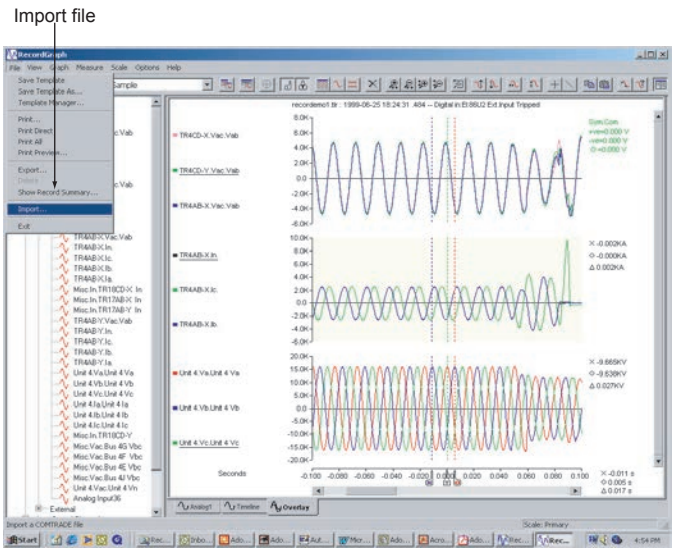


Figure 2.123: Import COMTRADE File

Choose COMTRADE File

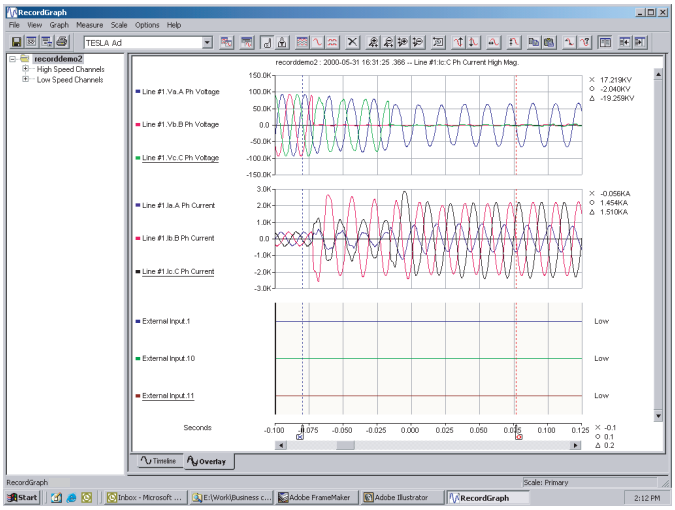


Figure 2.124: Select COMTRADE File

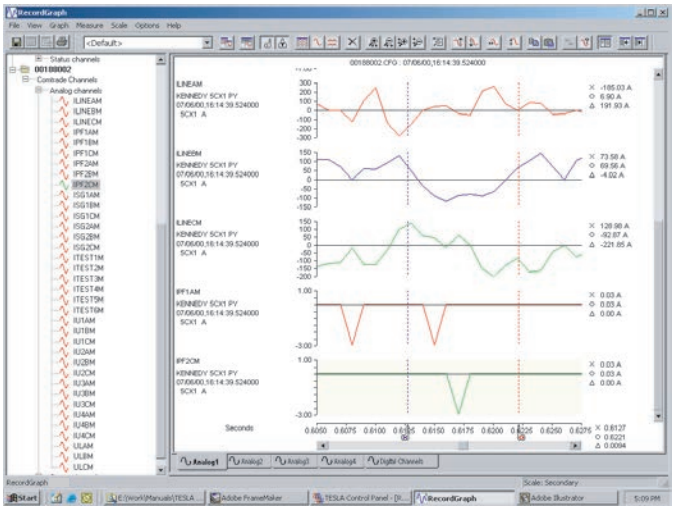


Figure 2.125: Apply <Default> Template

2.18 Print Options

The following options are available:

- Print... – pops-up a print option dialogue box to select paper size, orientation and other options.
- PrintDirect – sends active view directly to the default printer.
- PrintAll – sends all the views directly to the default printer.
- Print Preview…– displays standard preview window.

3 Record Export

The record export utility lets you convert records into a number of different formats for use with other software tools.

COMTRADE

Common Format for Transient Data Exchange is an industry standard record format used to share data between tools and to replay faults through a test set. The export utility supports both ASCII and binary COMTRADE formats and creates output that complies with the latest (1999) or older version (1991) of the standard.

PTI

Power Technologies Incorporated produces widely used power system modelling tools. Records can be exported in a PTI-compliant format for import into PTI tools. The export utility supports ASCII format and creates output that complies with PTI version 1 or version 2 formats.

Excel (CSV)

Records can be exported in basic comma separated values (also known as comma-delimited) ASCII format suitable for importing into standard tools such as Microsoft Excel.

All quantities are exported in secondary values.

3.1 Launch the Export Utility

To launch the export utility:

1. Double-click Recordings from the Main Menu.
2. Select a local record from the record list.
3. Select the *Export* button to launch the Export window.
4. Select the desired export output format and select *OK*.

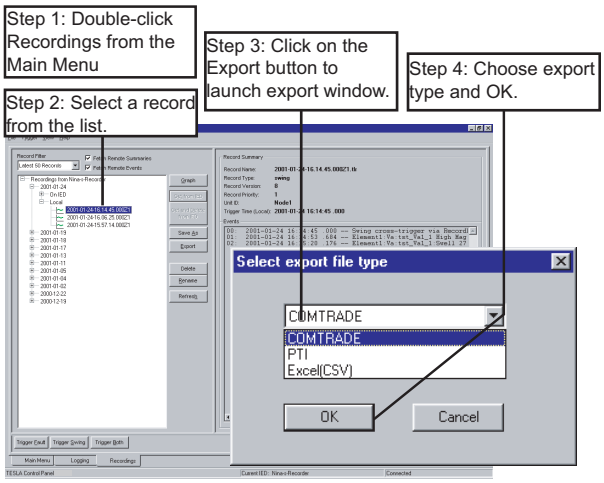

Step 1: Double-click Recordings from the Main Menu
Step 2: Select a record from the list.
Step 3: Click on the Export button to launch export window.
Step 4: Choose export type and OK.
Select export file type
COMTRADE
COMTRADE
PTI
Excel(CSV)
OK
Cancel

Figure 3.1: Select Export File Type

COMTRADE Format

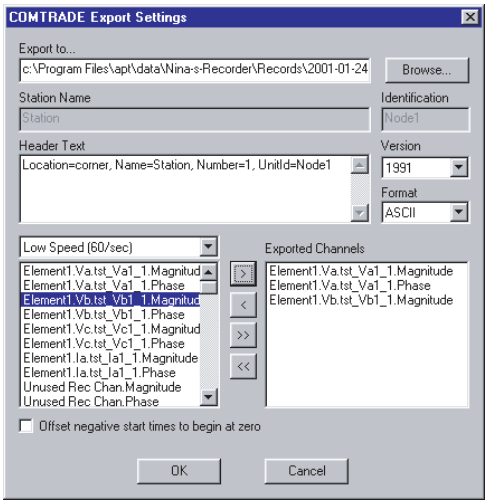


Figure 3.2: COMTRADE Settings

The COMTRADE format (IEEE C37.111) defines a common format for storing digital data records of transient and dynamic swing events.

COMTRADE export consists of up to four output files with the same base name and different file extensions: configuration files (.cfg), header files (.hdr), data files (.dat) and optional information files (.inf). COMTRADE export produces the configuration, header and data files.

With reference to “COMTRADE Settings” on page 3-3,

Table 3.1: COMTRADE Format

Name	Function
Export to.	The base file name and directory of the output files are set using the Export to.. option. By default the base filename is the same as the record you are exporting. You can edit this or use the Browse button to set a new directory and/or base filename.
Station Name and Identification	The Station Name and Identification fields are set by default using the unit’s Station which are written as the first line in the.cfg output file.
Header Text	The Header Text field contains the text written into the COMTRADE header (.hdr) file. By default, the field contains the Location, Name, Number and the Unit ID of the unit that produced the record. This text can be modified, deleted or extended as desired.
Version	The Version field lets you select the revision of COMTRADE standard to produce. COMTRADE has been an evolving standard and a number of changes have been made over the years. 1991 and 1999 COMTRADE versions are supported.

Table 3.1: COMTRADE Format	
Format	The Format field specifies that the data in the COMTRADE file (ASCII or BINARY format). ASCII data has the advantage of being usable by simple text editor and spread sheet programs, but results in a significantly larger record relative to binary format. BINARY format is recommended if the software package you are using for the data, supports binary format COMTRADE.
Selecting Channels (Exported Channels)	You must select the channels from the record that you want to include in the output file. For convenience, the digital data recorded is classified into: • High Speed (5760/sec): Analog and external digital input channels sampled at the high speed transient data rate. • High Speed (480/sec): Analog and internal logic channels produced 8 times per cycle. • Low Speed (60/sec): Analog input channels sampled at the low speed swing data rate. Select the desired channel from the list with a left-click. Multiple channels can be selected using standard Windows selection actions (click + Ctrl or Shift keys).
>	Place selected channels in the Exported Channels list box.
>>	Place all channels into the Exported Channels list box.
<	Delete a channel from the Exported Channel list box.
<<	Delete all channels from the Exported Channel list box.
☐ Offset negative start times to begin at zero	When checked, this option shifts the negative time to start from zero.

PTI Format

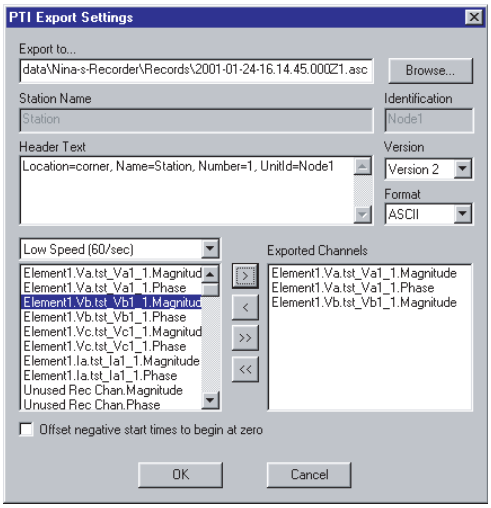


Figure 3.3: PTI Settings

The PTI file format is used to import records into the Power Technologies Incorporated system modelling software.

Output File PTI export produces a single output file with an .asc extension.

Table 3.2: PTI Format

Name	Function
Export to..	The base filename and directory of the output files are set using the Export to.. option. By default the base filename is the same as the record you are exporting. You can edit this or use the Browse button to set a new directory and/or base filename.
Station Name and Identification	The Station Name field is set by default using the unit's Station Name setting. It is written as the first line after all the channel names. This text can not be edited. The Identification field is not written to the PTI output file.
Header Text	The Header Text field contains the text that is written as a single line in the fourth line in the output file. By default, the field contains the Location, Name, Number and Unit ID of the recorder that produced the record. This text can be modified, deleted or extended as desired.
Version	The Version field lets you select between PTI version 1 and version 2. Please refer to PTI documentation for details on the differences of these versions. Format Only ASCII format output files are available.
Format	ASCII is the only format option for PTI.

Table 3.2: PTI Format	
Channel Selection	Use Channel Selection to select channels to export. You must select the channels from the record that you want to include in the output file. For convenience, the digital data recorded is classified into: • High Speed (5760/sec): Analog and external digital input channels sampled at the high speed transient data rate. • High Speed (480/sec): Analog and internal logic channels produced 8 times per cycle. • Low Speed (60/sec): Analog input channels sampled at the low speed swing data rate. Select the desired channel from the list with a left-click. Multiple channels can be selected using standard Windows selection actions (click + Ctrl or Shift keys).
>	Place selected channels in the Exported Channels list box.
>>	Place all channels into the Exported Channels list box.
<	Delete a channel from the Exported Channel list box.
<<	Delete all channels from the Exported Channel list box.
☐ Offset negative start times to begin at zero	When checked, this option shifts the negative time to start from zero.

Excel (CSV) Format

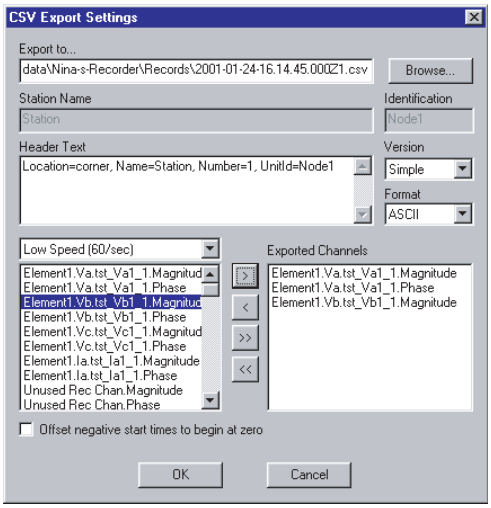


Figure 3.4: Excel (CSV) Settings

The Excel CSV (Comma Separated Value) format is used to import records into a Microsoft Excel spreadsheet. This format is also known as comma delimited ASCII and can generally be used by most programs that import data arrays.

Excel CSV export produces a single output file with a .csv extension, which is recognized by Excel. Excel is automatically launched when you double-click on file.

Table 3.3: Excel (CSV) Format

Name	Function
Export to..	The base filename and directory of the output files are set using the Export to.. option. By default the base filename is the same as the record you are exporting. You can edit this or use the Browse button to set a new directory and/or base filename.
Station Name and Unit ID	The Station Name and Identification fields are not written to the Excel CSV format output file.
Header Text	There is no header text written to the Excel CSV format output file.
Version	There are no version options for the Excel CSV output.
Format	ASCII is the only format options for the Excel CSV output.

Table 3.3: Excel (CSV) Format	
Channel Selection	You must select the channels from the record that you want to include in the output file. For convenience, the digital data recorded is classified into: • High Speed (5760/sec): Analog and external digital input channels sampled at the high speed transient data rate. • High Speed (480/sec): Analog and internal logic channels produced 8 times per cycle. • Low Speed (60/sec): Analog input channels sampled at the low speed swing data rate. Select the desired channel from the list with a left-click. Multiple channels can be selected using standard Windows selection actions (click + Ctrl or Shift keys).
>	Place selected channels in the Exported Channels list box.
>>	Place all channels into the Exported Channels list box.
<	Delete a channel from the Exported Channel list box.
<<	Delete all channels from the Exported Channel list box.
☐ Offset negative start times to begin at zero	When checked, this option shifts the negative time to start from zero.

Exporting T-PRO Through Fault Events in Excel (CSV) Format

Through fault event files (*.tpe) can be exported using Excel (CSV) format.

1. Open RecordBase View application and select a T-PRO event file as shown below (if the event file does not exist in the database, you can simply click on the "Add" button and select T-PRO event file to add it to the existing database).

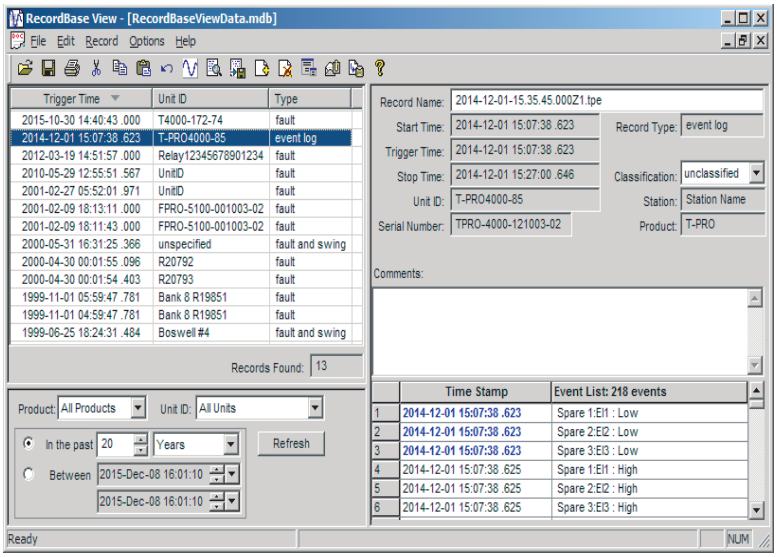

RecordBase View - [RecordBaseViewData.mdb]
File Edit Record Options Help
Trigger Time | Unit ID | Type
2015-10-30 14:40:43 .000 | T4000-172-74 | fault
2014-12-01 15:07:38 .623 | T-PRO4000-85 | event log
2012-03-19 14:51:57 .000 | Relay12345678901234 | fault
2010-05-29 12:55:51 .567 | UnitID | fault
2001-02-27 05:52:01 .971 | UnitID | fault
2001-02-09 18:13:11 .000 | FPRO-5100-001003-02 | fault
2001-02-09 18:11:43 .000 | FPRO-5100-001003-02 | fault
2000-05-31 16:31:25 .366 | unspecified | fault and swing
2000-04-30 00:01:55 .096 | R20792 | fault
2000-04-30 00:01:54 .403 | R20793 | fault
1999-11-01 05:59:47 .781 | Bank 8 R19851 | fault
1999-11-01 04:59:47 .781 | Bank 8 R19851 | fault
1999-06-25 18:24:31 .484 | Boswell #4 | fault and swing
Records Found: 13
Record Name: 2014-12-01-15.35.45.000Z1.tpe
Start Time: 2014-12-01 15:07:38 .623
Record Type: event log
Trigger Time: 2014-12-01 15:07:38 .623
Stop Time: 2014-12-01 15:27:00 .646
Classification: unclassified
Unit ID: T-PRO4000-85
Station: Station Name
Serial Number: TPRO-4000-121003-02
Product: T-PRO
Comments:
Product: All Products
Unit ID: All Units
In the past 20 Years
Between 2015-Dec-08 16:01:10
2015-Dec-08 16:01:10
Refresh
Time Stamp | Event List: 218 events
1 | 2014-12-01 15:07:38 .623 | Spare 1:EI1 : Low
2 | 2014-12-01 15:07:38 .623 | Spare 2:EI2 : Low
3 | 2014-12-01 15:07:38 .623 | Spare 3:EI3 : Low
4 | 2014-12-01 15:07:38 .625 | Spare 1:EI1 : High
5 | 2014-12-01 15:07:38 .625 | Spare 2:EI2 : High
6 | 2014-12-01 15:07:38 .625 | Spare 3:EI3 : High
Ready
NUM

Figure 3.5: RecordBase View main window with T-PRO Event records

2. Click on "Export" toolbar button which displays "Select export file type" dialog and select Excel (CSV) file type.

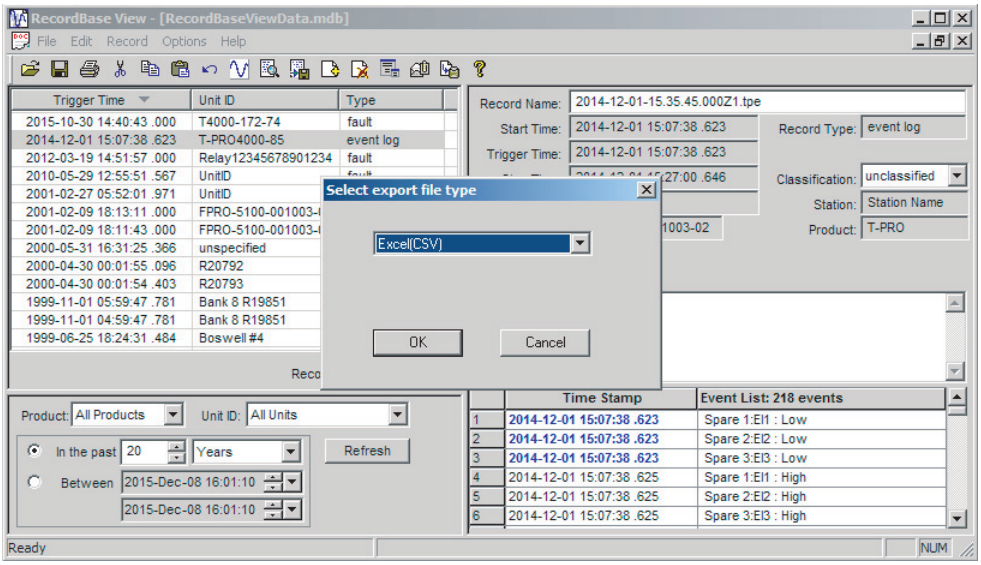

RecordBase View - [RecordBaseViewData.mdb]
File Edit Record Options Help
Select export file type
Excel(CSV)
OK
Cancel
Trigger Time | Unit ID | Type
2015-10-30 14:40:43 .000 | T4000-172-74 | fault
2014-12-01 15:07:38 .623 | T-PRO4000-85 | event log
2012-03-19 14:51:57 .000 | Relay12345678901234 | fault
2010-05-29 12:55:51 .567 | UnitID
2001-02-27 05:52:01 .971 | UnitID
2000-05-31 16:31:25 .366 | unspecified
2000-04-30 00:01:55 .096 | R20792
2000-04-30 00:01:54 .403 | R20793
1999-11-01 05:59:47 .781 | Bank 8 R19851
1999-11-01 04:59:47 .781 | Bank 8 R19851
1999-06-25 18:24:31 .484 | Boswell #4
Record Name: 2014-12-01-15.35.45.000Z1.tpe
Start Time: 2014-12-01 15:07:38 .623
Record Type: event log
Trigger Time: 2014-12-01 15:07:38 .623
Classification: unclassified
Station: Station Name
Product: T-PRO
Product: All Products
Unit ID: All Units
In the past 20 Years
Between 2015-Dec-08 16:01:10
2015-Dec-08 16:01:10
Refresh
Time Stamp | Event List: 218 events
1 | 2014-12-01 15:07:38 .623 | Spare 1:EI1 : Low
2 | 2014-12-01 15:07:38 .623 | Spare 2:EI2 : Low
3 | 2014-12-01 15:07:38 .623 | Spare 3:EI3 : Low
4 | 2014-12-01 15:07:38 .625 | Spare 1:EI1 : High
5 | 2014-12-01 15:07:38 .625 | Spare 2:EI2 : High
6 | 2014-12-01 15:07:38 .625 | Spare 3:EI3 : High
Ready
NUM

Figure 3.6: Export file type selection Excel (CSV) format

3. Once you select Excel (CSV) file export type, the following dialog will be displayed to select the file name. Choose the desired location and file name and click OK to export the event data.

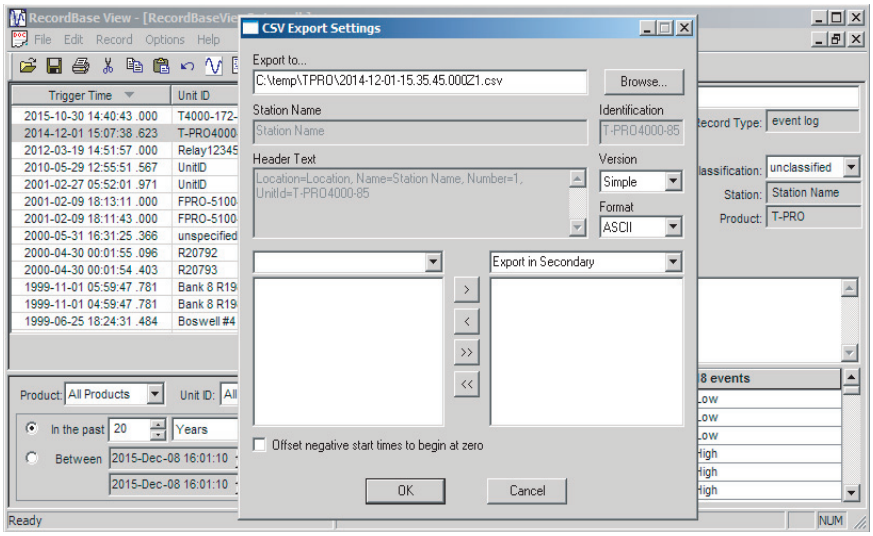


Figure 3.7: File and Location selection through CSV Export settings

4. Double click on the exported Excel (CSV) file to view the events arranged in descending order. A typical example of the csv file is depicted below.

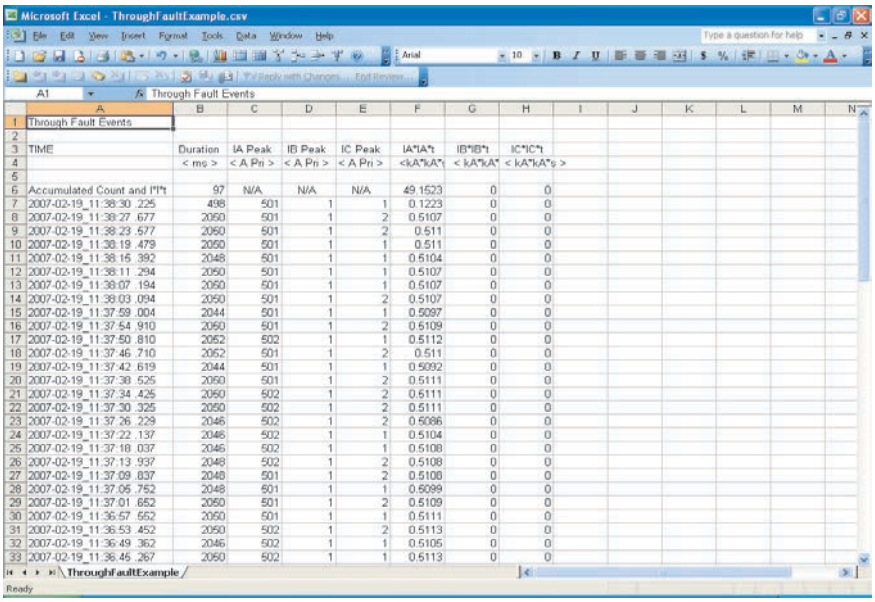


Figure 3.8: Example of converted through fault events as depicted in Microsoft Excel

You can also export the event file using right context menu from the explorer and follow Steps 2 and 3.

Note that selecting any export file other than the Excel (CSV) for T-PRO event file will result in "No data was selected, nothing eas exported" dialog and the export process will be terminated.

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